The Sizewell C Project

6.11 Volume 10 Project-wide, Cumulative and Transboundary Effects

Chapter 4 Assessment of Cumulative Effects with Other Plans, Projects and Programmes

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4 Assessment of Cumulative Effects with Other Plans, Projects, and Programmes

4.1 Introduction

4.1.1 This chapter of **Volume 10** of the **Environmental Statement (ES)** (Doc Ref. Book 6) provides the assessment of cumulative effects with other plans, projects and programmes. These cumulative effects arise when impacts from the proposed development combine with impacts from other planned/potential third party plans or projects (usually within the vicinity of the site), resulting in a change to the overall magnitude of impact acting on a receptor and potentially resulting in a significant effect. The cumulative effects are discussed within the following sections of this chapter on a topic by topic basis.

4.1.2 **Chapter 1** of **Volume 10** of the **ES** provides the introduction, legislation, guidance and methodology to the assessment of cumulative effects with other plans and projects. The long and short list of schemes are available within **Appendix 1A** and **1B** of this volume respectively.

4.1.3 The cumulative assessment of marine ecology is presented within **Appendix 4C** of this volume, with an executive summary within **section 4.22** of this chapter. This is due to the scale of the assessments undertaken in response to consultation and the nature of marine ecology and sediments.

4.1.4 The following sections of this chapter cover the assessment of impacts with other plans and projects on a topic by topic basis. These sections cover any specific methodology for each topic in addition to the methodology presented in **Chapter 1** of this volume. Generally, the assessments have considered the following phases of development:

- Construction assessment scenario which comprises:
  - construction at the main development site and permanent associated development, including the operation and removal and reinstatement of temporary development at the main development site at the later stages of construction; and
  - construction, operation and removal and reinstatement of temporary off-site developments (i.e. off-site sports facilities at Leiston) and temporary associated developments (i.e. northern

park and ride, southern park and ride, freight management facility (FMF) and green rail route).

- Operational assessment scenario which comprises:
  - operation of the permanent development at the main development site; and
  - operation of permanent associated developments (i.e. two village bypass, Sizewell link road, highway and rail improvement works).

4.1.5 For some assessments, the construction phase impacts for the Sizewell C Project are assessed for the early years of construction (assumed 2023) and the peak year of construction at the main development site (assumed 2028). Where these are relevant, they are referred to in the topic sections below.

4.2 Conventional Waste and Material Resources

a) Methodology

i. Zone of Influence

4.2.1 The assessment of the conventional waste management and material resources cumulative effects has been undertaken in accordance with the methodology provided in **Volume 1, Appendix 6D** of the **ES.**

4.2.2 As set out in **Volume 1, Appendix 6D** of the **ES**, the examination of the use of material resources and the generation and management of waste is undertaken across two geographically distinct areas. The first study area is based on the area of the completed works within the site boundary, as this constitutes the area within which construction materials would be consumed (used, reused and recycled) and waste would be generated. The second study area focuses on an area sufficient to identify the suitable waste infrastructure that could accept arisings of waste generated by the Sizewell C Project, and feasible sources and availability of construction materials typically required for major infrastructure projects. Therefore, for the purposes of the cumulative assessment, the second study area that focusses on the county of Suffolk has been used. Beyond this, any other development in-combination with the main development site and associated developments would be unlikely to give rise to any significant cumulative effects on material resources and waste management infrastructure.

4.2.3 **Volume 1, Appendix 1B** of the **ES** identifies a range of developments within Suffolk short-listed for the cumulative assessment. These developments range in size, approval date and approval conditions, with construction

timelines unconfirmed. However, construction must have commenced within two to three years of planning permission or reserved matters approval. As such, given the nature and scale of the applications, it is likely that the majority of the small scale residential developments will have completed construction prior to 2022. Schemes with the potential for cumulative waste and material resource effects

4.2.4 Non-Sizewell C schemes within the study area relevant for the cumulative assessment (county of Suffolk) also include the East Anglia ONE North, TWO and THREE schemes.

ii. General methodology

4.2.5 The sensitive receptors which could potentially experience cumulative effects as a result of the use of material resources include quarries and other sources of minerals, and other finite raw material resources. The potential cumulative impacts that these receptors may experience include:

- the depletion of non-renewable resources; and
- the impact on the national or local demand for materials.

4.2.6 The sensitive receptors which could potentially experience cumulative effects as a result of waste generation and management are landfills and other waste management infrastructure. The potential cumulative impacts these receptors may experience include:

- utilisation and depletion of the remaining local landfill capacity and occupation of available waste management infrastructure capacity.

4.2.7 This assessment has been carried out using professional judgement and is based on currently available information. Data on waste generation and material resource use of cumulative schemes is limited, therefore, a qualitative assessment of the likely cumulative effects has been undertaken.

b) Assessment of potential cumulative effects during construction

i. Early years

4.2.8 During the early years of construction of the Sizewell C Project (when all associated developments and the main development site are undergoing construction), cumulative effects relating to conventional waste and materials

may arise in-combination with all of the non-Sizewell C schemes scoped into the assessment.

4.2.9 The construction of these non-Sizewell C schemes could potentially be concurrent with the early years of the construction of the main development site and associated developments, and, due to their proximity to the site, may cause construction cumulative effects. Although it is unlikely that all of the schemes on the short-list are scheduled to be constructed during this period, this would be the worst-case scenario.

4.2.10 The waste and materials anticipated to be generated or used by these short-listed, non-Sizewell C schemes or the timescales over which waste would be generated and materials required are not known at present.

4.2.11 There is the potential that collectively, the short-listed non-Sizewell C schemes could have an adverse impact on the capacity of receiving waste management facilities within Suffolk. It is anticipated that the non-Sizewell C schemes would all generate waste and require materials during any enabling works, construction and operation, and that such waste would require treatment and/or disposal at third party waste management facilities.

4.2.12 The Suffolk Waste Study 2018 (Ref. 4.1) provides future projections for waste arisings which account for the projected change in waste generation regionally. Therefore, it is considered that the assessment presented in **Volume 2, Chapter 8** of the **ES** against the future projections of waste management infrastructure capacity in Suffolk would have also accounted for the change in regional waste management capacity with the cumulative schemes scoped into the assessment. As set out within **Volume 2, Chapter 8** of the **ES,** following the implementation of mitigation measures, it is anticipated that there will be no significant residual effects from waste generation during the whole of the Sizewell C construction phase against the future forecast waste projections.

4.2.13 There is also the potential for a significant requirement for materials, particularly during the construction of each of the non-Sizewell C schemes. **Volume 2, Chapter 8** of the **ES** identifies significant residual effects of the Sizewell C Project on material resource demand for concrete, steel and bitumen. It is therefore considered that the cumulative effect with non-Sizewell C schemes would also be **significant**.

4.2.14 Mitigation measures, identified in **Volume 2, Chapter 8** of the **ES** for conventional waste and material resource use, will be implemented as part of the construction of the proposed development. The detailed design for the main development site and associated developments will also take into

consideration any impacts and recommended mitigation measures associated with material resource use and waste generation during construction of the main development site and associated developments. The non-Sizewell C schemes themselves will also be subject to the National Planning Policy Framework (NPPF) and, where relevant, National Policy Statements (NPSs), and will require mitigation and control measures to be adopted during the construction through management plans to reduce impacts to the environment from material resource use and generation of waste, including dust generation and potential mobilisation of contaminants. It is considered that no further mitigation is practicable to reduce the effects associated with conventional waste generation and material resource use.

ii. Peak years

4.2.15 During the peak of construction of the Sizewell C Project (when all associated developments are operational and the main development site is under construction), cumulative effects relating to conventional waste and materials may arise in combination with the short-listed non-Sizewell C schemes. It is possible that some of the non-Sizewell C schemes will have been constructed by the time the associated developments are operational and will therefore be operational themselves.

4.2.16 Sensitive receptors which could potentially experience cumulative effects relating to conventional waste and materials generated during the peak of construction of the main development site and operation of the associated developments, in combination with the construction and operation of the non-Sizewell C schemes listed in the short-list, remain the same as for the early years identified above.

4.2.17 As set out within **Volume 2, Chapter 8** of the **ES** following the implementation of mitigation measures, it is anticipated that there will be no significant residual effects from waste generation during the whole of the Sizewell C construction phase against the future forecast waste projections. **Volume 2, Chapter 8** of the **ES** identifies significant residual effects of the Sizewell C Project on material resource demand for concrete, steel and bitumen. It is therefore considered that the cumulative effect with non-Sizewell C schemes would also be **significant**. Mitigation for waste generation and material resource use is set out within **Volume 2, Chapter 8** of the **ES**. No further mitigation measures are considered practicable.

iii. Removal and reinstatement of temporary development

4.2.18 During the later years of construction of the main development site (during the removal and reinstatement phase of the temporary development at

associated development and main development site), no cumulative effects relating to conventional waste and materials are anticipated, as the majority of the short-listed non-Sizewell C schemes will be operational and not generate construction and demolition waste. Therefore, no further mitigation is considered to be required.

c) Assessment of potential cumulative effects during operation of the main development site

4.2.19 During the operation of the main development site, cumulative effects relating to conventional waste and materials may arise in combination with the operation of the short-listed non-Sizewell C schemes.

4.2.20 Sensitive receptors could potentially experience cumulative effects relating to conventional waste and materials during the operation of the main development site in combination with the operation of the short-listed non-Sizewell C schemes.

4.2.21 Non-Sizewell C schemes are likely to be required to produce operational waste strategies with the aim of reducing the effects on waste management infrastructure, in addition to mitigating their own impacts through securing measures such as community infrastructure levy or s.106 agreements. Similarly, Sizewell C would be operated in accordance with a fully integrated management system, which would also consider waste management and material resource use – refer to **Volume 2, Chapter 8** of the **ES**.

4.2.22 It is considered that the cumulative effects would remain **not significant** for the capacity of waste management infrastructure within Suffolk and material resource demand in Suffolk and the United Kingdom (UK), as described within **Volume 2, Chapter 8** of the **ES**. Albeit the scale of effect depends on the types and quantities of wastes generated and materials required cumulatively across all schemes, including Sizewell C and the shortlisted non-Sizewell C schemes. Therefore, no further mitigation is required for these cumulative effects.

4.3 Socio-economics

a) Methodology

4.3.1 The assessment of the socio-economic cumulative effects has been undertaken in accordance with the socio-economic assessment methodology provided in **Volume 1**, **Appendix 6E** of the **ES**.

i. Zone of Influence

4.3.2 Determining a Zone of Influence (ZOI) for certain topic areas is less appropriate because of the nature of the assessment. The cumulative impact assessment for socio-economic effects is based on a different approach from other disciplines of the **ES**, in that it utilises broader 'macro' projections of cumulative influences relevant to particular potential effects (e.g. effects on local and regional labour market), rather than focusing on potential cumulative effects of specific developments on individual receptors.

4.3.3 Primarily, cumulative socio-economic effects are driven by the potential for net additional (i.e. above trend) growth in population, including demographic breakdown, and changes to demand for labour and skills.

4.3.4 The key potential cumulative impacts for assessment are:

- the effects on the labour market and demand for labour, particularly at the regional level, as identified in the Overarching NPS for Energy (EN-1) (para 5.12.3) (Ref. 4.2), and at the local level, related to the assumed home based (HB) workforce identified in **Appendix 9A**, 'Technical Note 1: Workforce Profile', as provided in **Chapter 9, Volume 2** of the **ES**; and

- the impacts of the non-home-based (NHB) workforce on demand for accommodation and public services in the identified areas where potential impacts may occur.

4.3.5 **Volume 2, Chapter 9** of the **ES** (Socio-economics) also considers the potential for effects on tourism as required by EN-1 (paragraph 5.12.2-3 - "*Where the project is likely to have socio-economic impacts at local or regional levels, the applicant should undertake and include in their application an assessment of these impacts as part of the Environmental Statement… which may include effects on tourism*").

4.3.6 The effect of Sizewell C on tourism is identified within **Volume 2, Chapter 9** of the **ES** (Socio-economics) as having the potential to result in:

- very local effects on businesses and activities where there is a combination of significant residual environmental effects, combined with; and

- perception-related effects as a result of sensitivities to different aspects of the Sizewell C Project (the potential for perception of changes to e.g. traffic, where this is already an influencer on propensity to visit).

4.3.7 As such, in some locations, times and for some visitors, there is the risk of a minor to moderate adverse effect to arise that has the potential to be **significant** at the local level, without mitigation in the early years of construction.

4.3.8 Given the local aspect of the effects of the Sizewell C Project, and the lack of consideration of tourism effects related to cumulative schemes identified in this assessment, it is considered unlikely that the cumulative effects of other projects would be any greater than minor to moderate adverse significance as identified in **Volume 2, Chapter 9** of the **ES** (Socio-economics).

ii. Schemes for Consideration

Economic, Employment and Labour Market Effects

4.3.9 The construction labour market is most appropriately addressed at a regional level as suggested in NPS for Nuclear Power Generation (EN-6) (Ref. 4.3).

4.3.10 In the case of labour demand, construction labour demand would be a small part of a wider regional and national construction labour market with smaller individual schemes forming part of an overall background trend in demand.

4.3.11 The other nationally significant infrastructure projects (NSIPs) in the region (as detailed below), have the potential for significant impacts on labour demand and therefore need to be considered individually. Other non-NSIP developments are therefore taken to be included in the background trend and are inherently assessed in the main assessment and therefore not covered in this chapter. The NSIPs for consideration in terms of employment and labour market effects are:

- East Anglia ONE North Offshore Windfarm (ID 13).
- East Anglia TWO Offshore Windfarm (ID 14).
- East Anglia THREE Offshore Windfarm (ID 575) including Underground Cabling (ID 366).

Housing Growth, Population Change and Impact on Public Services

4.3.12 In the case of overall population and household change and growth, the short list of plans, projects and programmes, provided in **Appendix 1B** of this volume, includes a large number which are residential or include residential uses as part of a mixed-use scheme.

4.3.13 Rather than assess potential impacts of each scheme, which would require the development of a complex series of assumptions about phasing and net impacts which would be subject to major uncertainty, it has been assumed that they would take place as part of wider background development trends, subject to market conditions.

4.3.14 It has been considered more appropriate to use household and population estimates produced by the Office for National Statistics (ONS) and the housing delivery assumptions set out in the planning policies of local authorities.

4.3.15 As population projections are based on both natural change and migration, the migration aspect extrapolated into the future acts as a proxy for estimating future housing growth. This is based on annual delivery of homes as recorded by the local authorities, which is similar to the delivery rates identified in development plans.

4.3.16 As such, all of the residential cumulative developments included in the short list of plans, projects and programmes, provided in **Appendix 1B** of this volume, are assumed to be included in these projections, and therefore, further consideration of their effects on population and public services, has been scoped out.

4.3.17 The assumptions on household and population growth and delivery, and their impacts on population contain the following components:

- projected overall population, and composition by age, from the 2016-based ONS population projections; and
- projected households from the 2016-based ONS population projections.

iii. General Methodology

4.3.18 The following assessment assumes that the proposed mitigation measures for public services and accommodation, as described in **Chapter 9, Volume**

2 (Socio-economics) of the **ES**, would be implemented (through the Section 106 agreement); therefore the consideration of potential cumulative effects, is based on residual impacts of the Sizewell C Project, set out in the same chapter.

4.3.19 Levels of significance of socio-economic impacts resulting from the Sizewell C Project are described in **Chapter 9, Volume 2** of the **ES**. In addition, general methodology and approach to significance criteria is described in **Chapter 6, Volume 1** of the **ES**.

b) Assessment of potential cumulative effects during construction

i. Labour Market

Description of Potential Impact

4.3.20 During the construction phase of the Sizewell C Project, and particularly during peak years of construction, cumulative effects related to the labour market may arise in-combination with NSIPs in the region (listed above). The NSIPs identified have the potential to generate cumulative economic effects in terms of:

- demand for employment and skills in the regional construction labour market (and creation of employment opportunities and sustainable careers, skills and training benefits); and
- wider economic benefits in the form of gross value added (GVA) as a result of project investment contributing to workers' spending and earnings.

4.3.21 Details of these projects that are relevant to potential cumulative effects on the labour market are set out in **Tables 4.1** and **4.2**:

Table 4.1: Relevant Socio-economic Information for East Anglia ONE North & East Anglia TWO (Ref. 4.4 and 4.5)

East Anglia ONE North & East Anglia TWO	
Description	• Offshore wind development comprising two sites, which could consist of up to 115 turbines, generators and associated infrastructure, with an installed capacity of 600MW to 800MW, located 36 kilometres (km) from Lowestoft and 42km from Southwold. • Landfall location at Thorpeness, where the offshore cables are brought ashore and jointed to the onshore cables, underground cables, an onshore substation, a National Grid substation and National Grid overhead line realignment works.

East Anglia ONE North & East Anglia TWO	
Status	• Both accepted for examination. • East Anglia TWO Environmental Impact Assessment (EIA) Scoping Opinion issued 8 December 2017. • East Anglia ONE North EIA Scoping Opinion issued 11 December 2017. • Applications for both submitted in October 2019; and accepted for examination in November 2019. A preliminary meeting to discuss the examination procedure is scheduled for March 2020.
Construction Workforce	• On average, each would sustain 265 full-time equivalent per year, and a total of 796 full-time equivalent years overall. • It should be noted that if there is a commitment to a load out port in the spatial area covered by New Anglia Local Enterprise Partnership (NALEP) (i.e. Suffolk or Norfolk), so it is possible that more of the economic benefit from offshore construction staff could be retained in the region. However, where staff will be based and which port vessels used would be based on multiple factors outside the control of the proposed East Anglia ONE North project.
Operational Workforce	• Nationally, the proposed East Anglia ONE North project may generate 400 to 900 full-time equivalents for at least 25 years, or a mid-point of 600 (of which 500 would be in the NALEP area). • Nationally, the proposed East Anglia TWO project may generate 400 to 900 full-time equivalents for at least 25 years, or a mid-point of 600 (of which 500 would be in the NALEP area).
Significant Effects	• Moderate beneficial effects are anticipated in terms of construction employment generated by onshore and offshore works. • Major beneficial effects are anticipated for local accommodation businesses and their employees (as a result of uptake of rooms by temporary construction workers). • Major beneficial effects are anticipated for long-term (operational) employment creation in the national and regional labour markets.
Mitigation / Enhancement	• Identifies that cooperation with Sizewell C and consideration of accommodation strategy may be necessary. • Draws on a range of traffic/transport and environmental mitigations with regard to limiting effects on tourism and recreational disturbance.
Timescales	• Construction anticipated to start in 2025 (East Anglia ONE North) and 2024 (East Anglia TWO). • Commercial operation - mid-2027.
GVA Estimate	• Construction: Not assessed. • Operation: Not assessed.

Table 4.2: Relevant Socio-economic Information for East Anglia THREE (Ref. 4.6)

East Anglia THREE	
Description	• The 1400MW East Anglia THREE project is the second project to be developed in the East Anglia Zone and covers an area of approximately 305km^2. An application to increase the capacity was approved in June 2019. • Landfall at Bawdsey with onshore transition pits to join the offshore and onshore cables.
Status	• On 28 March 2017 the Planning Inspectorate (PINS) issued a report of recommendation to the Secretary of State for Business, Energy and Industrial Strategy (BEIS) on East Anglia THREE. The Secretary of State approved the application for consent which was granted on 7th August 2017. • In June 2019 BEIS approved a non-material change to increase the overall capacity of the windfarm to 1400MW.
Construction Workforce	• Nationally the net job demand of the project will be between 1,067 and 4,195 full-time equivalents. • 285 construction workers will be required to construct the onshore cable route.
Operational Workforce	• East Anglia THREE Limited estimates the annual operation and maintenance requirement will be approximately 100 full-time equivalents.
Significant Effects	• The project will provide beneficial but not significant employment impacts. The offshore construction phase will provide moderate temporary beneficial residual impacts while the onshore construction element will provide a minor temporary beneficial residual impact. The operation and maintenance phase is likely to provide a minor ongoing beneficial residual impact. • No significant tourism and recreation impacts are predicted as a result of the proposed East Anglia THREE project, and its associated offshore and onshore electrical infrastructure.
Mitigation / Enhancement	• A programme of up-skilling and training is being developed and implemented, complementary to regional initiatives and central government policy. These initiatives would mitigate any potential adverse labour market pressures. The project and up-skilling initiatives will also provide further support to develop the offshore renewables industry in East Anglia.
Timescales	• Offshore construction of the project would begin in 2020 at the earliest and would continue for approximately three and a half years. • Onshore works would start in 2020 at the earliest and last for approximately one year if built in a single phase and two years if built in two phases. • Does not overlap with East Anglia ONE construction phase.
GVA Estimate	• Construction - £68.5million GVA and £228.4 million GVA at an East of England level. Nationally the net value of the project will be between £91.3 million GVA and £359.0 million GVA. In total the onshore element will provide £57.7million GVA. • Operation - operation and maintenance phase will provide £341.5million cumulative GVA to the East of England region over the lifetime of the project.

Description of Baseline and Future Baseline (where cumulative interactions anticipated)

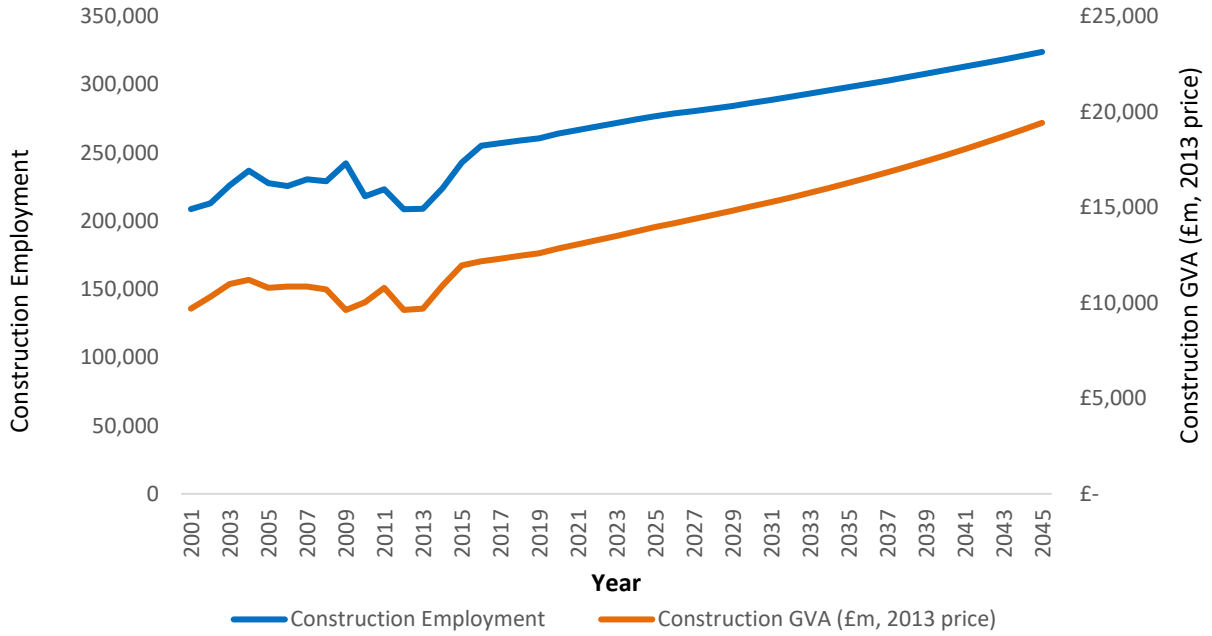
Employment Baseline

4.3.22 An existing baseline and future baseline for socio-economic indicators is set out in **Volume 2**, **Chapter 9** of the **ES**.

4.3.23 In terms of the future baseline for labour market indicators, the East of England Forecasting Model (EEFM) projects the following relevant key indicators:

- GVA for the construction sector (the contribution generated by labour and goods/materials to the economy) – see **Plate 4.1**;
- total jobs in construction (estimated based on projecting forward previous trends, taking into account the concentration of jobs in the sector compared to the concentration nationally) – see **Plate 4.1**; and
- International Labour Organisation (ILO) unemployment – this is the government's preferred measure of unemployment and includes those unemployed and actively seeking work (and are ready to work) and those not seeking work, but who would like to work and are ready to.
  - For the East of England, ILO unemployment in the East of England is projected to remain relatively stable at around 45,400 people.

Plate 4.1: Construction Economy Baseline Indicators - Employment and GVA - EEFM



4.3.24 These projections include previous trend data, but do not specifically include projects/interventions which may be considered to be above the trend.

Labour Market and Skills

4.3.25 In addition to EEFM labour market indicators, the Construction Industry Training Board and Construction Skills Network generate research into the future for construction skills, employment and their drivers on a 4-year basis. This includes assumptions about infrastructure based on the Government's 2018 National Infrastructure and Construction Pipeline (Ref. 4.7), which includes East Anglia ONE.

4.3.26 The latest report considers the period from 2019 to 2023 and sets out that:

- With an annual average growth rate of 1.2% for construction output between 2019–23, the East of England is similar to the forecasted UK average growth rate of 1.3%.
- Construction employment in the region is also forecast to grow at an average rate of 0.4% per year, rising from nearly 245,000 workers at the end of 2018 to nearly 250,000 by 2023.

- The average annual recruitment rate in the East of England is forecast to be 2.0% of the base 2018 workforce, stronger than the UK figure of 1.2%. This means the region would be looking for an extra 4,910 workers each year.

- In terms of roles, at a national level the greatest demand is for construction process management, other construction professional and technical staff scaffolders, wood trades, logistics personnel and plant operatives. In the East of England, growth is expected to be strongest for managerial, professional and technical occupations.

- At present, the forecasts for the East of England do not include Sizewell C. However, it is notable that stalled new nuclear power generation projects in the north west (Moorside) and Wales (Wylfa Newydd) have had significant effects on revising down growth in those regions from previous projections.

Assessment of Cumulative Impact - Construction

4.3.27 Project estimates of Sizewell C's labour market and economic effects are set out in **Volume 2, Chapter 9** of the **ES**, supported by information about the workforce profile and distribution in the following appendices to that chapter:

- **Appendix 9A**: Technical Note 1: Workforce Profile – This note sets out how the workforce is anticipated to change throughout the Sizewell C Project in terms of its size, components (e.g. skill levels) and the extent to which the workforce is HB or NHB. It is based on information from Hinkley Point C, Sizewell B and other projects, as well as early contractor involvement.

- **Appendix 9C**: Technical Note 3: Workforce Spatial Distribution – This note describes how the workforce is anticipated to distribute geographically at the peak of construction, drawing on information from **Appendix 9A** and the Gravity Model (a 'distance decay' model based on workers' propensity to travel to work, informed by value of time estimates and the location of available accommodation).

4.3.28 **Tables 4.1** and **4.2** set out the additional profile of labour demand and GVA across the region from other NSIPs – in summary this sets out the following indicative workforce demand, provided in **Table 4.3**:

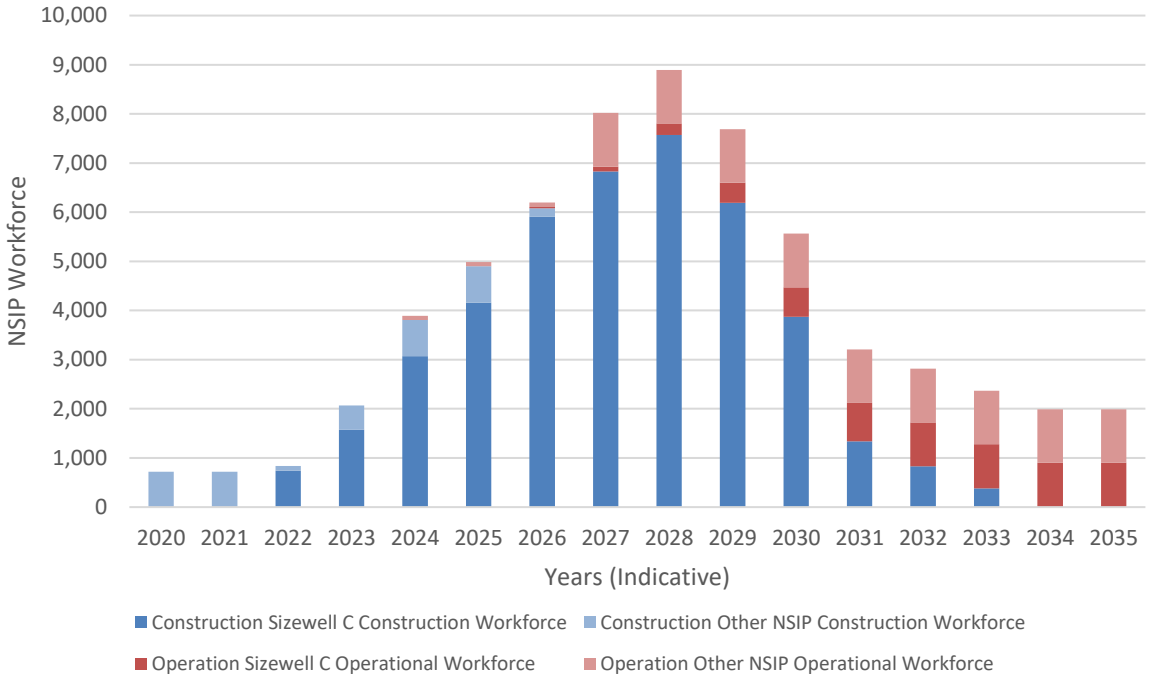
Table 4.3: Direct Employment Generation over time in East of England during construction and operational phases

	Sizewell C			East Anglia ONE North		East Anglia TWO		East Anglia THREE		East of England Construction Jobs (EEFM, 2017)	ILO Unemployment (EEFM, 2017)
	Home-based	Non-home-based	Operational								
2020	--	--	--	--	--	--	--	621	97	264,008	46,170
2021	--	--	--	--	--	--	--	621	97	266,608	46,300
2022	220	520	--	--	--	--	--	--	97	269,199	45,160
2023	510	1,060	--	--	200	--	200	--	97	271,812	44,740
2024	940	2,130	--	167	200	167	200	90		274,349	44,120
2025	1,140	3,020	--	169	200	169	200			276,838	44,130
2026	1,560	4,350	26	86	--	86	--			278,864	43,960
2027	1,870	4,960	99	500		500				280,458	43,770
2028	2,250	5,320	233							282,466	43,590
2029	1,920	4,270	411							284,392	43,600
2030	1,200	2,670	602							286,651	43,610
2031	420	920	780							288,841	43,830
2032	240	590	894							291,100	44,060
2033	100	280	900							293,420	44,290
2034	900									295,809	44,520
2035										298,092	44,760

	KEY:
	Operational
	Construction – Onshore
	Construction - Offshore

4.3.29 **Plate 4.2** combines the Sizewell C construction workforce with the cumulative construction workforce generated by other NSIPs in the region. It also sets out the operational workforce during the construction phase, up to the point of full operation of all NSIPs and Sizewell C. This sets out that the peak years of Sizewell C are not anticipated to overlap with the combination of construction workforce demand from the other combined NSIPs in the region.

Plate 4.2: NSIP Construction and Operational Workforce in the East of England



4.3.30 In years where there is an overlap, cumulative NSIP demand is less than Sizewell C's overall peak and represents an average increase of c.18% over the demand generated by Sizewell C (noting that this is well below the overall peak, and would be supported by the mitigation/enhancement measures implemented by these NSIPs set out in **Tables 4.1** and **4.2**).

4.3.31 As such, cumulative effects related to the labour market during the construction phase are likely to be no more significant than the effects generated by Sizewell C and reported in **Volume 2, Chapter 9** of the **ES**. Set against the overall regional construction workforce growth projections and labour market slack illustrated on **Plate 4.1**, the additional effect is likely to be negligible at a regional scale.

4.3.32 Sizewell C has set in place comprehensive mitigation (summarised below, and set out in detail within the **Economic Statement** (Doc Ref. 8.9)) focused around working with existing employment, skills, education and supply chain infrastructure / strategies for the region in order to help deliver the benefits and avoid disbenefits of demand for skilled construction labour.

4.3.33 In terms of wider economic benefits, the construction phase of Sizewell C alone is anticipated to contribute substantially to the regional economy in terms of GVA (as set out in detail in the **Economic Statement** (Doc Ref.

8.9)), and is considered to be a moderate beneficial effect which would be **significant** in terms of supply chain benefits, employee wages and employee expenditure, as set out in **Volume 2, Chapter 9** of the **ES** (Socio-economics).

4.3.34 **Table 4.2** sets out the anticipated contribution to GVA from East Anglia THREE (no GVA contribution was calculated for East Anglia ONE North and East Anglia TWO). Though the extent of supply chain spending and labour investment are potentially defined differently from the Sizewell C contribution, it is anticipated that these would overlap and combine to support similar sectors and construction activities, contributing to at least a moderate beneficial effect at the regional scale which would be **significant**.

c) Assessment of Cumulative Impact - Operation

4.3.35 As set out in **Volume 2, Chapter 9** of the **ES** (Socio-economics), the Sizewell C Project would support 700 permanent operational roles by the end of the construction phase, for around 60 years of operation. There would be an additional 200 contractors working at Sizewell C at any given time, and for the period when Sizewell B and Sizewell C are both operational, each reactor would generate temporary, short-term employment for outages of around 1,000 workers, for six weeks around every 18 months.

4.3.36 When operational, Sizewell C would create an increase of 36% in jobs within energy generation sector in Suffolk (based on 2018 ONS Business Register and Employment Survey data which shows there are currently 2,500 jobs in Standard Industrial Classification 351: Electric Power Generation, Transmission and Distribution). This would represent a beneficial impact in terms of the policy aspirations of the local authorities, Local Enterprise Partnership (LEP) and the sub-regional economy. This would be a moderate beneficial impact at the local level which would be **significant**.

4.3.37 The operational power station should provide a long-term continuation of a substantial quota of skilled and secure jobs for local people with a major energy sector employer.

4.3.38 Stakeholders are keen to develop the external image of Suffolk as an advanced economy meeting the wider economic aspirations of the Energy Coast initiatives within NALEP, to diversify the economic base, address pockets of deprivation, improve the skills base in the long-term (especially in engineering and construction) and attract and retain more workers (especially younger workers, and those who have left Suffolk to go to university elsewhere who may not otherwise return to the area).

4.3.39 As set out in **Tables 4.1** and **4.2**, the other NSIPs are likely to support the following additional employment:

- Nationally, the proposed East Anglia ONE North project may generate 400 to 900 full-time equivalents for at least 25 years, or a mid-point of 600 (of which 500 would be in the NALEP area).
- Nationally, the proposed East Anglia TWO project may generate 400 to 900 full-time equivalents for at least 25 years, or a mid-point of 600 (of which 500 would be in the NALEP area).
- East Anglia THREE Limited estimates the annual operation and maintenance requirement would be approximately 100 full-time equivalents.

4.3.40 The cumulative effect of employment generation (and by association, GVA) is therefore considered to represent a beneficial impact in terms of the policy aspirations of the local authorities, LEP and the sub-regional economy. This would be a moderate beneficial impact at the local level which would be **significant**.

i. Mitigation / Enhancement

4.3.41 SZC Co.'s proposed mitigation / enhancement of benefits in terms of supply chain, employment, skills and education are inherently cumulative, as they work within the framework of development, plans and growth sector strategies (e.g. construction and energy) set by regional bodies such as Suffolk County Council and NALEP for the region.

4.3.42 This includes specifically working with regional employers and developers of other NSIPs in the region through measures set out below and as set out in the **Economic Statement** (Doc Ref. 8.9).

ii. Employment, Skills and Education

4.3.43 SZC Co. recognise the importance of taking a holistic approach to supporting labour market resilience and support for the region's growth strategies and key sectors including construction and energy, in order to avoid risks of exceeding capacity in key skills within the labour market for the delivery of all of the NSIPs in the East of England.

4.3.44 SZC Co. has worked closely with stakeholders in the region to develop a strategy with a range of measures that combine to create an environment in

which education, skills and workforce development can flourish, to the benefit of both the Sizewell C Project and other projects in the region.

4.3.45 The **Employment, Skills and Education Strategy** is included as **Appendix A** to the **Economic Statement** (Doc Ref. 8.9). It sets out a strategic approach centred around the following strategic priorities:

- Creating economic benefit and improving social mobility by:
  - leaving a legacy;
  - addressing key government and regional policy priorities; and
  - linking employment, skills and education to complementary activities for developing the supply chain, as set out in **Appendix B** to the **Economic Statement** (Doc Ref. 8.9).
- Minimising workforce and project risk caused by a lack of availability, capability, capacity or competence in the UK or regional skills base.
- Where appropriate, integrating strategic activity between Sizewell C and Hinkley Point C – and in the future Bradwell B - by leveraging the full benefit of 'fleet effect' for skills and workforce, and extending this to co-working with other energy projects in the region co-ordinated by NALEP.

4.3.46 The **Employment, Skills and Education Strategy** (Doc Ref. 8.9) sets out a 'prospectus' of required roles and qualifications for Sizewell C in the future by phase of construction and type of role. These roles have a high degree of similarity with some of the civil engineering, mechanical and engineering roles also likely to be required by other developments and NSIP construction projects in the region.

4.3.47 It then sets out a range of interventions and investments that the Sizewell C Project would make, to be secured through the Section 106 agreement, which would inherently benefit the wider labour market and therefore other projects / developments, including:

- A Sizewell C Jobs Service - SZC Co.'s focus on recruitment would be on targeting the right people into the right jobs. This would provide a service that is managed centrally but delivers locally though a small number of dedicated staff in Suffolk and through optimising external partnerships.

- Skills initiatives – including (where funding is referred to, this would be secured through the Section 106 agreement):
  - A flexible Asset Skills Enhancement and Capability Fund with a strong, accountable governance structure including Tier 1 contractors and local stakeholders.
  - A commitment to funding a Regional Skills Coordinator post to provide a focal point of coordination and skills planning between the Sizewell C Project and providers.
  - Supporting contractors in exploring options for training and assessment facilities to enable the competence of workers to be assessed and to identify areas of additional training.
- Education initiatives – partnering with regional stakeholders to invest in a range of activities including:
  - supporting specific and existing educational initiatives in the region that are working well or are supporting young people in raising their aspirations for careers in energy, engineering or construction;
  - supporting and investing in specific interventions with a focus on career introduction and development;
  - starting early with 'aspiration raising' activities;
  - introducing actual opportunities to 'have a go' with an emphasis on the promotion of Sizewell C's critical skills that are in short supply;
  - creating an innovative and 'first of a kind' bursary scheme to support the creation of alternative pathways for those that haven't reached the required entry level, providing a 'second chance' for young people in Leiston, Lowestoft, Great Yarmouth and Ipswich; and
  - establishing a Young Sizewell C programme providing an insight programme to inspire and build awareness of opportunities among young people who are closest to the workplace and to help pipeline them into actual Sizewell C opportunities.

iii. Supply Chain

4.3.48 SZC Co. has set out to develop a strategy for its supply chain for Sizewell C that builds on the good progress made at Hinkley Point C and seeks to engage and promote business in the region to gain competency to compete for and win contracts on the Sizewell C Project, and complement the requirements of other civil engineering energy projects in the region.

4.3.49 The **Supply Chain Strategy** is included as **Appendix B** to the **Economic Statement** (Doc Ref. 8.9). The strategy's aim is to successfully deliver the construction and commissioning of the Sizewell C Project utilising the expertise and capability within the local and regional supply chain, where possible.

4.3.50 SZC Co. anticipates that Sizewell C would be able to deliver a similar level of economic benefits to Suffolk and the East of England, in terms of supply chain opportunities for local and regional businesses, as Hinkley Point C is delivering for Somerset and the South West.

4.3.51 An important role of the strategy is to contribute to the economy of the East of England and the UK more widely: Sizewell C would support the maintenance and development of the UK nuclear sector and wider construction innovations and skills.

4.3.52 The **Supply Chain Strategy** (Doc Ref. 8.9) sets out a range of initiatives, to be secured in the Section 106 agreement, that would enable the region to capture economic benefits generated by the goods and services needed for the delivery of the Sizewell C Project and, inherently, other projects in the region. These include:

- a Sizewell C Supply Chain Team, partnering with the Suffolk Chamber of Commerce. The Team would assist local and regional businesses in winning contracts on the Sizewell C Project through:
  - management of a supply chain website with project information, details of work packages and professional standards, signposting to relevant support, details of events and examples of success; and
  - a Sizewell C Supply Chain Portal capturing details and core capabilities of regional businesses and mapping them against requirements of the Sizewell C Project, brokering business support and matching suppliers with SZC Co. and Tier 1 contractors;

- contractor engagement including senior leadership commitments from Tier 1 contractors to engage with the local and regional supply chain, including attendance at 'meet the buyer' events; and

- monitoring and reporting in order to track local and regional levels of engagement.

4.3.53 Sizewell C's strategy is to integrate employment, skills and education with the supply chain development activity in order to help jobseekers find roles on the Sizewell C Project and to help backfill vacancies that may become harder-to-fill within the supply chain, using the Sizewell C Jobs Service.

iv. Residual Cumulative Impacts

4.3.54 The mitigation sets out to ensure that, in the worst case, the cumulative impact on regional skills demand during the construction phase would be negligible and therefore **not significant**. In developing and improving the regional skills set there is the potential for this to be enhanced to a moderate beneficial effect, which is therefore considered to be **significant**.

4.3.55 In terms of operational employment and GVA, the cumulative projects represent a beneficial impact in terms of the policy aspirations of the local authorities, LEP and the sub-regional economy. This would be a moderate beneficial impact at the local level which would be **significant**.

4.3.56 As such, the effects would remain moderate beneficial and **significant**, as described within **Volume 2, Chapter 9** of the **ES**.

Housing, Population and Public Services

Description of Potential Impact

4.3.57 The development of the Sizewell C Project would take place in the context of housing development and background population growth and trends over an anticipated 9-12 year construction period. This could impact on demand for accommodation and public services.

Description of Baseline (where cumulative interactions anticipated)

4.3.58 A full description of the baseline for accommodation and public services is set out in the main Sizewell C Project socio-economic assessment provided in **Chapter 9, Volume 2** of the **ES**.

4.3.59 **Table 4.4** sets out the key demographic and housing measures projected by the ONS (2016-based) and EEFM (2017-based) datasets over the indicative construction phase of Sizewell C:

Table 4.4: Demographic and Housing Projections (ONS 2016-based Subnational Population Projections)

Year	Population**	*Age 0-16*	*Age 16-64*	*Age 65+*	Households
2019	247,764	41,975	137,582	68,203	109,477
2021	248,881	42,066	137,663	69,151	110,130
2022*	250,040	42,133	137,639	70,268	110,730
2023	251,170	42,155	137,536	71,476	111,412
2024	252,263	41,991	137,459	72,815	112,039
2025	253,337	41,800	137,466	74,071	112,662
2026	254,400	41,595	137,376	75,428	113,230
2027	255,416	41,391	137,029	77,002	113,780
2028	256,419	41,106	136,755	78,560	114,444
2029	257,414	40,860	136,429	80,127	115,045
2030	258,370	40,679	135,853	81,836	115,587
2031	259,300	40,505	135,273	83,524	116,097
2032	260,224	40,365	134,677	85,177	116,617
2033*	261,151	40,229	134,109	86,814	117,131

* Indicative start and end dates for the Sizewell C construction phase –

**Figures are correct as published by ONS

Assessment of Cumulative Impact

Housing Developments / Growth

4.3.60 The study area considered for the socio-economic assessment (local authority areas within or partly within the Sizewell C 60-minute travel area for NHB workers) would see substantial growth in both households and population over the construction period of Sizewell C, with just over 11,000 additional residents and around 8,000 new homes and households.

4.3.61 This growth would require additional social infrastructure and community provision over this period, which would need to be addressed through the councils' social infrastructure planning process.

4.3.62 Non-Sizewell C schemes will have the responsibility to mitigate their impacts through mechanisms such as Community Infrastructure Levy or s.106 agreements. In addition, as potential significant effects of the Sizewell C Project would be mitigated through the proposed Section 106 agreement, and any potential impacts of new housing would happen regardless of Sizewell C, cumulative impacts specific to Sizewell C with other non-Sizewell C developments are considered to be negligible and therefore **not significant.**

4.3.63 It should be noted that, in the years building to peak workforce and up to the end of the construction phase of Sizewell C, all of the net population growth is forecast to be in retired age groups, with a projected net decline in working age and under-16 age groups. This would therefore create demand for different public services from those that would be required by the Sizewell C Project's temporary construction workforce.

Nationally Significant Infrastructure Projects

4.3.64 It is not possible to determine the extent to which the other NSIPs would generate demand for a NHB workforce which may have the potential to overlap with Sizewell C's workforce and add to demand for accommodation and public services, as the extent of the workforce required by these NSIPs has not been considered to that level of granularity (e.g. in terms of HB and NHB split) in the environmental statements for those projects.

4.3.65 However, SZC Co.'s mitigation strategies have been set in place to mitigate the peak effects of Sizewell C's workforce, which, as shown in **Plate 4.2**, is anticipated to be greater than cumulative effects in preceding years. As such, cumulative effects of the construction workforce from NSIPs on demand for accommodation and public services is likely to be no greater than the significance of effects identified in **Volume 2, Chapter 9** of the **ES**, for which mitigation is identified.

4.3.66 There is limited information regarding the operational workforce associated with other NSIP projects in terms of their level of local recruitment, spatial distribution and characteristics. However, given the relatively long timescale, slow build-up and capacity within accommodation markets to respond to change, the cumulative effects are considered negligible and therefore **not significant**.

Mitigation / Enhancement

4.3.67 As the assessed cumulative impacts would be negligible and therefore **not significant**, there is no required mitigation. The developers of any new

housing schemes would be required to mitigate potential impacts directly resulting from their development (through Section 106 agreements and Community Infrastructure Levy).

4.3.68 The proposed mitigation measures for the Sizewell C project include monitoring arrangements and contributions should the wider NHB workforce and their families impact on public services.

Residual Cumulative Impacts

4.3.69 There is limited information regarding the operational workforce associated with other NSIP projects in terms of their level of local recruitment, spatial distribution and characteristics. However, given the relatively long timescale, slow build-up and capacity within accommodation markets to respond to change, the cumulative effects are considered negligible and therefore **not significant**.

4.3.70 As such, the effects would remain negligible and **not significant**, as described within **Volume 2, Chapter 9** of the **ES**.

4.4 Transport

a) Methodology

i. Zone of Influence

4.4.1 The methodology for assessing cumulative construction traffic effects is based on the **Transport Assessment** (Doc Ref. 8.5) for Sizewell C and **Volume 2, Chapter 10** of the **ES**, which considers the environmental effects of traffic for the proposed development in detail.

4.4.2 The ZOI extends to Lowestoft to the north, Ipswich to the south and the A140 to the west, including the A12, A14 and key routes envisaged to be used by Sizewell C traffic.

ii. General methodology

4.4.3 It is important to note that the traffic modelling that supports the **Transport Assessment** (Doc Ref. 8.5) and **Volume 2, Chapter 10** of the **ES** includes committed development and committed highway works, as agreed with Suffolk County Council, as well as background traffic growth. The assessment also includes traffic associated with an outage at Sizewell B and the Sizewell B relocated facilities works.

4.4.4 The assessment of the cumulative transport effects therefore only assesses non-committed developments to determine the potential cumulative transport effects should such non-committed developments get consent and be implemented.

4.4.5 The same assessment methodology has been applied to the cumulative assessment as to the assessment undertaken in **Volume 2, Chapter 10** of the **ES**, which is referred to within this section as the 'core assessment'. The methodology is summarised in **Appendix F** of **Volume 1, Chapter 6** of the **ES**.

4.4.6 On some days during the peak construction year of the Sizewell C Project, the number of heavy goods vehicle (HGV) deliveries would be higher than on a typical day, so two scenarios have been assessed within the **Transport Assessment** (Doc Ref. 8.5) for the peak construction phase, representing a 'typical day' and a 'busiest day' with the only difference being the number of Sizewell C HGVs.

4.4.7 For the purposes of the cumulative assessment, the development scenarios assessed are:

- 2023 early years; and
- 2028 peak year of construction 'busiest day'.

4.4.8 The operational year for Sizewell C (2034) has not been assessed cumulatively as the Scottish Power development discussed in **section 4.4.12** of this chapter would be completed by then.

4.4.9 The sensitivity of traffic links applied to the cumulative assessment is summarised in **Appendix A** of **Volume 2, Chapter 10** of the **ES**.

4.4.10 Traffic link screening has been undertaken for the cumulative traffic flows based on the screening methodology summarised in **Appendix F** of **Volume 1, Chapter 6** of the **ES**.

4.4.11 The assessment of the potential cumulative effects on transport during the construction phase has considered severance, pedestrian delay, amenity, fear and intimidation, driver delay, and accidents and road safety.

iii. Schemes for consideration

4.4.12 Scottish Power is proposing to develop the East Anglia project for new offshore wind farms and connection to the national electricity grid, which is scheduled to begin construction sooner than the Sizewell C Project.

However, if both projects were to go ahead, the construction phases would likely overlap.

4.4.13 Following discussions with Scottish Power it was determined that the construction of two elements of the East Anglia project could overlap with the construction of the Sizewell C Project:

- East Anglia ONE North; and
- East Anglia TWO.

4.4.14 These two Scottish Power projects would likely be under construction during the early years of Sizewell C construction and could potentially be constructed either consecutively or concurrently. For the purposes of assessing a worst case, the 'concurrent build' traffic flows have been used, derived from the preliminary environmental information for the East Anglia TWO development.

4.4.15 Although the proposed timeline for concurrent construction shows the East Anglia ONE North and East Anglia TWO developments completed before the Sizewell C peak construction phase, if the construction programme were to be delayed the concurrent build could still be underway by Sizewell C peak construction phase so therefore the East Anglia ONE North and East Anglia TWO 'concurrent build' traffic flows have also been assessed in the Sizewell C 2028 peak construction 'cumulative' scenario. The Scottish Power development would be completed by the Sizewell C operational stage.

4.4.16 The derivation of Scottish Power traffic flows relating to the construction of East Anglia ONE North and East Anglia TWO, for the purposes of assessing a 'cumulative' scenario in 2023 (Sizewell C early years) and 2028 (Sizewell C peak year of construction), is set out in **Appendix 8C** of the **Transport Assessment** (Doc Ref. 8.5).

4.4.17 **Table 4.5** provides a summary of the Sizewell C and non-Sizewell C developments that have the potential to result in cumulative effects for transport (i.e. those not in the model and those that have not been scoped out), therefore not assessed in the context of Sizewell C. Further details of these schemes are provided in **Appendix A** of **Volume 10, Chapter 1** of the **ES**.

Table 4.5: Summary of Sizewell C and Non-Sizewell C Cumulative Traffic Effect Assessments

Sizewell C Development	Non – Sizewell C Development	Application Reference	Potentially Affected Receptors
Early years and peak construction of the Sizewell C Project	Scottish Power East Anglia ONE North	DC/17/4883/SCO ID 13	Links on local highway network that traffic associated with both developments are likely to use
Early years and peak construction of the Sizewell C Project	Scottish Power East Anglia TWO	DC/17/4884/SCO ID 14	Links on local highway network that traffic associated with both developments are likely to use
Early years and peak construction of the Sizewell C Project	Felixstowe Road Logistics Yard	DC/19/4343/EIA ID 675	Links on local highway network that traffic associated with both developments are likely to use
All of the Sizewell C Project	Field lying to the West of 4 Barnaby Green to provide camping facility for 6 tipis	DC/19/1876/COU ID 631	Links on local highway network that traffic associated with both developments are likely to use
All of the Sizewell C Project	Ipswich to Felixstowe railway line, Trimley St Mary – level	DC/19/1488/CON	Links on local highway network that traffic associated with both

Sizewell C Development	Non – Sizewell C Development	Application Reference	Potentially Affected Receptors
	crossings closure		developments are likely to use

4.4.18 A quantitative assessment has been undertaken for the Sizewell C Project with Scottish Power (East Anglia ONE North and East Anglia TWO). In addition, a qualitative cumulative assessment has been undertaken for the other schemes in **Table 4.5** above to assess the potential cumulative effects of identified shortlist of schemes that are not included in the traffic modelling. For the purposes of the qualitive cumulative assessment of transport effects, professional judgement has been used to identify road links that could experience cumulative effects when the Sizewell C Project is considered in combination with short listed schemes.

4.4.19 The qualitative assessment has scoped out the non-Scottish Power developments for the following reasons:

- Felixstowe Road Logistics Yard – it is proposed to provide a logistics park for 85 HGVs on Felixstowe Road to the east of the proposed freight management facility for the Sizewell C Project. A screening request has been submitted for the proposal but not a planning application to date. The screening request forecasts 170 two-way HGV movements per day generated by the development with the HGV movements concentrated in two periods (i.e. 04:00-07:00 and 16:00-19:00). The morning peak use of the proposed logistics park will not coincide with the peak use of the freight management facility, except potentially during the hour of 06:00-07:00 when HGVs will be starting to arrive and depart from the Sizewell C freight management facility. The evening peak use of the proposed logistics park would not coincide with the peak use of the Sizewell C freight management facility, which is expected to have fewer HGVs arriving and departing from it in the evening compared to the morning and interpeak period. The HGVs will use Felixstowe Road and the A12 and A14 in the vicinity of the two sites, which are not sensitive roads from an environmental perspective as non-motorised users do not use these roads. Therefore, the cumulative effects associated with the proposed logistics yard on Felixstowe Road would be **not significant**.
- Camping facility at Barnaby Green – it is proposed to provide a new camping facility at Barnaby Green near Wangford on the A12. The proposed development was consented by East Suffolk Council in 2019

and would provide 6 tipis and associated facilities. The level of traffic to be generated by the development would be insignificant and the cumulative effects associated with the proposed development would be **not significant**.

- A number of level crossing closures are proposed on the Ipswich to Felixstowe branch line at Trimley St Mary. Public rights of way are to be diverted to provide alternative routes for users to cross the railway line. The proposed development will improve road safety and remove the need for vulnerable road users crossing the railway line at level crossings. The proposed development would not have a cumulative effect on the Sizewell C Project and therefore the cumulative effect would be **not significant**.

b) Assessment of potential cumulative effects with East Anglia ONE North and East Anglia TWO

4.4.20 **Appendix 4A** of this chapter presents the assessment tables for severance, pedestrian delay, amenity and fear and intimidation based on cumulative flows of the Sizewell C Project with the East Anglia ONE North and East Anglia TWO projects.

ii. Early years significant effects

4.4.21 A summary of the roads that the assessment shows would be likely to exhibit significant cumulative effects with East Anglia ONE North and East Anglia TWO during the early years is presented below, along with an explanation as to whether the effects are significant with the application of professional judgement.

Severance

4.4.22 The assessment shows that B1125 (B1125) would experience a **moderate adverse** effect on pedestrian severance. B1125 south of Blythburgh was classified as high sensitivity due to there being a higher than average accident rate. This would not impact severance but is considered later in this chapter as part of the assessment of accidents. Given this, it is considered that the effect on severance on link 17b would be **not significant**.

Pedestrian Delay

4.4.23 There are no cumulative effects on pedestrian delay in the early years associated with the increase in time for pedestrians to cross the road as a result of the increase in traffic.

4.4.24 The same effects apply to the pedestrian delay associated with the diversion of Public Rights of Way (PRoW) as for the core assessment as set out in **Volume 2, Chapter 10** of the **ES**.

Amenity

4.4.25 There are no road links that experience a significant adverse effect on amenity based on the 24 hour annual average weekday traffic (AAWT) flows.

4.4.26 The same roads as for the core assessment have a **significant** effect on amenity arising as a result of the change in heavy duty vehicles. These are as follows:

- Sizewell Gap (link 1) – **moderate adverse** effect on amenity; and
- B1122 (links 4c, 10, 13b, 64, 66 and 74) – **moderate adverse** effect on amenity for link 13b and **major adverse** effect for the other links.

4.4.27 The same professional judgement applies to the above links as for the core assessment provided in **Volume 2, Chapter 10** of the **ES**.

4.4.28 In addition to the above links that have the same cumulative effect on amenity as for the core assessment, the assessment shows that A1117 Elm Tree Road in Lowestoft (link 19a) would also experience a **moderate adverse** effect on amenity. It is classified as having a high sensitivity and low magnitude of impact, resulting in a **moderate adverse** effect on pedestrian amenity. It is classified as having high sensitivity due to the presence of the Dell Care Home. The road is a single carriageway with a 30mph speed limit and forms part of the Suffolk lorry route network. It is afforded with relatively wide footways on both sides of the road for the vast majority of the road and, where there is only one footway this is separated from the road by a grass verge. Whilst there is a more than doubling of heavy duty vehicles forecast on the road during peak construction, this should be seen in the context of circa 3% increase in total traffic on the route as a result of Sizewell C and Scottish Power traffic. The heavy duty vehicles would be spread throughout the day and it is considered that there would not be a material impact on the enjoyment of the route. As such, the effect on pedestrian amenity on the A1117 is considered to be **not significant**.

Fear and intimidation

4.4.29 The cumulative assessment shows that there are no links that would experience an increased magnitude of impact in fear and intimidation as a

result of the change in total traffic during the early years, which is consistent with the core assessment provided in **Volume 2, Chapter 10** of the **ES**.

4.4.30 However, there would be some road links that would experience an increased magnitude of impact in fear and intimidation as a result of the cumulative increase in heavy duty vehicles, which are all consistent with the core assessment provided in **Volume 2, Chapter 10** of the **ES**. These links are all on dual carriageway sections of the A12 with no footways or cycleways and therefore there would not be any pedestrians or cyclists using these links. As such, it can be concluded that the cumulative effect of the Sizewell C Project and East Anglia ONE North and East Anglia TWO on fear and intimidation in the early years would be **not significant**.

Driver and passenger delay

4.4.31 The assessment of driver delay is considered fully within the **Transport Assessment** (Doc Ref. 8.5) and this section summaries the cumulative effects of the Sizewell C Project and East Anglia ONE North and East Anglia TWO on vehicle journey time in the early years.

4.4.32 During the early years of construction, before any of the primary transport mitigation measures for the Sizewell C Project are completed, the journey time analysis shows that all of the routes would have less than 4% increase in journey time in the 08:00–09:00 peak hour with the exception of the A12 around Ipswich, which the modelling shows would increase by 23–35 seconds.

4.4.33 In the 17:00–18:00 peak hour, the changes in journey time are all within 8% (except for route 11 which is a short distance and the modelling shows would increase by circa 42 seconds.

4.4.34 The proposed highway schemes to be delivered by SZC Co. are to be constructed during the early years and have been designed to be built off-line as much as possible in order to minimise delay to existing road users. Notwithstanding this, there will be short-term delay to drivers when the off-line highway works are tied into the existing highway.

4.4.35 During the early years there will be abnormal load movements by road associated with both the Sizewell C Project and East Anglia ONE North and East Anglia TWO. These will be managed and co-ordinated through consultation with the relevant authorities and statutory notice provided prior to moving loads. Where possible abnormal loads will be co-ordinated so as not to be moved at the same time as East Anglia ONE North and East

Anglia TWO abnormal loads and moved outside of peak periods in order to minimise delay to road users.

4.4.36 There is expected to be a **minor adverse** effect on driver delay and bus passenger delay during the early years, which would be **not significant**.

4.4.37 With regards to rail, the early years rail operation associated with the movement of construction material would consist of two return freight trains per day operating once the Saxmundham to Leiston branch line had been upgraded and sidings had been constructed in the Land East of Eastlands Industrial Estate (LEEIE). Freight trains associated with the early years would operate after the last passenger train in the evening and before the first passenger train the following morning and would therefore not have any effect on rail passenger journey times. There would therefore be no cumulative effect on rail passenger delay during the early years.

Accidents and road safety

4.4.38 In the early years, changes in traffic volume due to Sizewell C and East Anglia ONE North and East Anglia TWO would typically be 1% or less on the A12, A1120, B1078 and B1119. Consequently, there would be a **negligible** effect on the number of personal injury collisions on these roads. On the A1094, B1122, B1069 and B1125, there would be a 2% to 5% increase in daily flows due to the cumulative effects of Sizewell C and East Anglia ONE North and East Anglia TWO, which is considered would also result in a **negligible** change in the number of collisions.

iii. Peak construction significant cumulative effects

4.4.39 A summary of the roads that the assessment shows would be likely to exhibit significant cumulative effects with East Anglia ONE North and East Anglia TWO during the peak year of construction is presented below, along with an explanation as to whether the effects are significant with the application of professional judgement.

Severance

4.4.40 The cumulative assessment shows that the same roads as for the core assessment have a **significant** effect on severance. There are no new significant effects on severance as a result of the cumulative assessment for peak construction. As such the same professional judgement as set out in the core assessment provided in **Volume 2, Chapter 10** of the **ES** applies. This includes an assessment of the effects of the PRoW diversions on severance.

Pedestrian delay

4.4.41 There are no cumulative effects on pedestrian delay during peak construction associated with the increase in time for pedestrians to cross the road as a result of the increase in traffic. The same effects apply to the pedestrian delay associated with the diversion of PRoW as for the core assessment as set out in **Volume 2, Chapter 10** of the **ES**.

Amenity

4.4.42 The cumulative assessment shows that the same roads as for the core assessment provided in **Volume 2, Chapter 10** of the **ES** have a **significant** effect on amenity. These are as follows:

- B1122 Abbey Road (link 5) – **moderate adverse** effect;
- B1122 (links 10, 66 and 74) – **major beneficial** effect;
- Sizewell link road (links 10a, 57, 63, 65) – **major adverse** effect;
- two village bypass (link 23a) – **major adverse** effect; and
- former A12 through Farnham and Stratford St Andrew – **major beneficial** effect.

4.4.43 The same professional judgement applies to the above links as for the core assessment provided in **Volume 2, Chapter 10** of the **ES**.

Fear and intimidation

4.4.44 The cumulative assessment shows that the cumulative effects on fear and intimidation during peak construction would be consistent with the core assessment provided in **Volume 2, Chapter 10** of the **ES**.

4.4.45 In addition to the cumulative effects on fear and intimidation that are consistent with the core assessment provided in **Volume 2, Chapter 10** of the **ES**, the cumulative assessment shows that there would be an increase in fear and intimidation in other sections of the A12 not previously highlighted in the core assessment. These additional sections include the A12 at Little Glemham and Marlesford, which would see the effect on fear and intimidation increase from **minor adverse** to **moderate adverse**, which is **significant**. This is as a result of the cumulative increase in heavy duty vehicles on the A12. The core assessment provided in **Volume 2, Chapter 10** of the **ES** shows that the effect on fear and intimidation on the A12 at Little Glemham and Marlesford in the 2028 reference case would be minor adverse and with the addition of the Sizewell C construction traffic is would remain minor

adverse, which is **not significant**. It is only with the addition of the East Anglia ONE North and East Anglia TWO traffic that the effect on fear and intimidation becomes **short-term significant**.

Driver and passenger delay

4.4.46 The assessment of driver delay is considered fully within the **Transport Assessment** (Doc Ref. 8.5) and this section summaries the cumulative effects of the Sizewell C Project and East Anglia ONE North and East Anglia TWO on journey time during peak construction.

4.4.47 At peak construction all of the highway improvement schemes associated with the Sizewell C Project will be operational. The journey time analysis shows that on some routes small increases may occur but these are generally less than one minute, or within 5% of the reference case travel time, and unlikely to be distinguishable from daily variation in travel time. Where larger increases occur, for example on routes 2 and 8 southbound during 17:00–18:00 hours, traversing the A12 through Woodbridge, proportionately these are still within 5% of reference case travel time so unlikely to be noticeable day to day.

4.4.48 During the peak construction there will be abnormal load movements by road associated with both the Sizewell C Project and East Anglia ONE North and East Anglia TWO. These will be managed and co-ordinated through consultation with the relevant authorities and statutory notice provided prior to moving loads. Where possible abnormal loads will be co-ordinated so as not to be moved at the same time as East Anglia ONE North and East Anglia TWO abnormal loads and moved outside of peak periods in order to minimise delay to road users.

4.4.49 There is expected to be a **minor adverse** effect on driver delay and bus passenger delay during peak construction, which would be **not significant**.

4.4.50 With regards to rail, the peak construction rail operation associated with the movement of construction material would consist of three return freight trains per day operating once the green rail route is operational. Freight trains associated with the peak construction would operate after the last passenger train in the evening and before the first passenger train the following morning, with the exception of one inbound train which would utilise an existing gap in the passenger timetable between 08:00-09:00. The freight rail movements during peak construction would therefore not have any effect on rail passenger journey times. There would therefore be **negligible** effect on rail passenger delay during peak construction, which would be **not significant**.

Accidents and Road Safety

4.4.51 At peak construction, changes in traffic volume due to the Sizewell C Project and East Anglia ONE North and East Anglia TWO would typically be 1% on the A12, A1120 and B1119, with **negligible** effect on the number of personal injury collisions on these roads. On the A1094, B1122, B1078, B1069 and B1125, there would be a 2%-6% increase in daily flows due to the Sizewell C Project and East Anglia ONE North and East Anglia TWO, which it is considered would also result in a **negligible** change in the number of collisions.

iv. Mitigation

4.4.52 It is considered that the proposed secondary mitigation set out for the core assessment provided in **Volume 2, Chapter 10** of the **ES** would mitigate the cumulative effects of Sizewell C and East Anglia ONE North and East Anglia TWO. The only exception to this is the potential significant effect on fear and intimidation at peak construction on the A12 at Little Glemham and Marlesford, which is considered below.

4.4.53 The cumulative assessment for Sizewell C with East Anglia ONE North and East Anglia TWO is based on the following worst case assumptions:

- The East Anglia ONE North and East Anglia TWO projects could potentially be constructed consecutively or concurrently but for the purposes of assessing a worst case, the 'concurrent build' traffic flows have been used.
- The proposed programme for East Anglia ONE North and East Anglia TWO for concurrent construction shows that construction would be completed before the Sizewell C peak construction phase. However the cumulative assessment has also assessed the 'concurrent build' East Anglia ONE North and East Anglia TWO traffic flows with Sizewell C peak construction.
- The assessment of East Anglia ONE North and East Anglia TWO is based on a worst case assessment that 85% of the development traffic routes to and from the south along the A12. It may be that less traffic routes from the south and more traffic routes from the north.
- The cumulative assessment is based on the busiest day at peak construction for the Sizewell C Project rather than the typical day.

4.4.54 Based on the above, it is possible that the significant adverse effect on fear and intimidation would not arise. The construction programmes for East Anglia ONE North and East Anglia TWO and the Sizewell C Project will be

monitored through the transport review group throughout the construction phase of the Sizewell C Project and should there be a potential for the worst case traffic flows to arise concurrently, additional mitigation measures would need to be secured through the transport contingency fund, which is to be secured via the Section 106 Agreement discussed in the draft **S106 Heads of Terms** appended to the **Planning Statement** (Doc 8.4). It is therefore considered that either the effect on fear and intimidation will be **not significant** in reality or that, if it does materialise that it can be managed through the transport review group and transport contingency fund and would be **not significant**.

4.5 Noise & Vibration

a) Methodology

4.5.1 The potential for noise and vibration from construction, operation and removal and reinstatement of Sizewell C and associated development sites to combine with noise and vibration from non-Sizewell C developments has been assessed based on the short list of plans, projects and programmes provided in **Appendix 1B** of this volume, planning applications and allocations. This has been undertaken to identify whether noise and vibration associated with these could result in significant cumulative effects in combination with Sizewell C.

4.5.2 For noise, a ZOI of 1km has been considered from the main development site during construction and operation, and a 500m ZOI has been considered for operation and construction effects from the associated developments. Cumulative noise effects from rail and road traffic have also been considered using a ZOI of 500m. Vibration effects have been considered up to 100m for construction activities from all elements of the Sizewell C project, including rail effects.

4.5.3 The basis on which these zones have been defined is that beyond these distances, predicted levels from activities from the construction and operation of the proposed development would be likely to be below a very low magnitude and hence would result in a negligible effect.

4.5.4 As described in **section 4.4**, construction road traffic associated with other large-scale developments, including Scottish Power developments, East Anglia ONE North and East Anglia TWO, is included in the ‘’with development’ modelled assessment scenarios for 2023 (Sizewell C early years) and 2028 (Sizewell C peak year of construction). The road traffic noise assessment for the 'with development' scenarios therefore includes the potential cumulative effects of these schemes.

b) Assessment of potential cumulative effects

4.5.5 A review of approved developments from the short list of plans, projects and programmes provided in **Appendix 1B** of this volume has revealed a number of housing applications and commercial proposals that could have a potential cumulative effect with the Sizewell C Project. Those where the construction works are likely to be complete, once construction of the Sizewell C Project commences and instead form part of the baseline or future baseline, are scoped out from further cumulative assessment. The short listed developments considered are as follows:

- 187 new dwellings. Johnsons Farm, Saxmundham Road, Leiston (ID 29).
- 77 new dwellings. Land, rear of St Margaret's Crescent, Leiston (ID 28).
- 6 new flats. Land at Colonial House, Station Road, Leiston (ID 17).
- 2 new dwellings. 2 Abbey Road, Leiston (ID 23).
- 100 new dwellings, employment (B1) use and public-house (A3/A4) use. Land east of Abbey Road, Leiston (ID 30).
- 7 new dwellings. The Mill, 22 Carr Avenue, Leiston (ID 15)).
- 18 new dwellings. Land west of Mill Cottage, Leiston (ID 31).
- 20 new dwellings. Gas Works, Carr Avenue, Leiston (ID 32) (Complete – baseline).
- Commercial at 11 Eastlands Industrial Estate. (ID 3) (Started and expected to be complete – future baseline).
- Commercial. Sizewell Crossing Industrial Estate (ID 38) (Complete – baseline).
- 2 new dwellings. 27A Heath View, Leiston (ID 37) (Started and expected to be complete – future baseline).

- Extension to Leiston Sports Centre. Red House Lane, Leiston (ID 11). (Complete – baseline).
- 65 new dwellings. Land south of Red House Lane, Leiston (ID 21) (Started and expected to be complete – future baseline).
- 8 new dwellings. Abbey View Lodges, 105 Abbey Road, Leiston (ID 40) (Started and expected to be complete).
- Galloper Windfarm. Onshore infrastructure, Sizewell Gap Road, Leiston (ID 22) (Complete – baseline).
- 82 bedroom hotel. A12, Main Road, Darsham (ID 89).
- Glemham Estate Reservoir. Hill Farm Road, Farnham (ID 195).
- Barn conversion to dwellings. Pond Farm, Hill Farm Road, Farnham (ID 196).
- 1 new dwelling. Cavan Cottage, High Street, Yoxford (ID 106).
- 15 new dwellings. Former Leiston & District Constitutional Club, Leiston (ID 609).

Cumulative effects with the rail proposals

4.5.6 There are a number of approved but as yet uncommenced residential developments in Leiston, which would be within 500m of the Saxmundham to Leiston branch line upgrades. Such upgrade works do not normally generate high levels of sound locally, or for long periods during construction. Residential receptors beyond a distance of approximately 130m of the branch line upgrade works would experience noise levels which would be negligible, even if there no screening provided from intervening buildings.

4.5.7 There is a theoretical potential for existing receptors within 130m of the line to experience a combined effect if rail line upgrade works are to occur at the same time as construction of nearby developments. This could occur in the vicinity of housing developments at Johnsons Farm, St Margaret's Crescent Colonial House, no.2 Abbey Road, The Mill (22 Carr Avenue) and (west of) Mill Cottage. The Saxmundham to Leiston branch line upgrade works are

expected to be completed during the first nine months of the main development site construction programme. However, the upgrade works are expected to be transient along the length of the line and would not be expected to remain within 130m of a residential receptor along the route for a period of time that would result in an impact result in a significant effect. In summary the cumulative effects of the proposed branch line upgrade works with other developments would be **not significant**.

4.5.8 Once the branch line is operational, no significant noise effects are predicted during the day. Rail freight movement noise on the branch line would be brief (minutes each) and infrequent and hence is considered unlikely to give rise to significant effects either cumulatively with the construction or operation of the other proposed developments. It is assumed that there would be no construction works at night, or significant operational activities at night at the other developments, and therefore no potential for cumulative effects. In summary the potential cumulative effects of the operation of the branch line with other developments would be **not significant**.

4.5.9 Although some ground vibration resulting in minor effects may arise from the upgrade works, a significant cumulative vibration effect is not predicted. Construction of residential developments are not likely to give rise to significant vibration effects, and therefore it not expected that there would any significant cumulative effects from vibration during construction.

4.5.10 The outline application for the residential, employment and restaurant development on land east of Abbey Road would be close to established dwellings to the west and north. Depending on the start dates and phasing of works for both the Abbey Road scheme and the Saxmundham to Leiston upgrade works, there is the potential for cumulative effects. However, the established Abbey Road dwellings are sufficiently distant from the branch line upgrade works (beyond 130m) and as the works are expected to be transient, the noise emissions would not result in a significant cumulative effect.

4.5.11 As for the cumulative assessment with other developments close to the branch line, once it is operational, no significant noise effects are predicted during the day. Rail freight movement noise on the branch line would be brief (minutes each) and infrequent and hence is considered unlikely to give rise to significant effects either cumulatively with the construction or operation of the Abbey Road scheme. It is assumed that there would be no construction works at night, or significant operational activities at night at the Abbey Road scheme, and therefore no potential for cumulative effects. In summary the potential cumulative effect would be **not significant**.

Cumulative effects with the two village bypass

4.5.12 At Farnham, the agricultural reservoir (DC/18/0322/FUL) and barn conversions (to dwellings, DC/17/1331/FUL) could potentially occur at the same time as one another or, one or both at the same time as the two village bypass construction works. Neither of the two Glemham Estate applications were required (by East Suffolk Council) to consider their impacts on the adjacent Pond Barn Cottages – the indication being that the modest complement of construction plant required for the reservoir construction would not have the potential to give rise to an adverse effect on Pond Barn Cottages. The construction of the two village bypass is expected to give rise to no greater than 65dB, $L_{Aeq,T}$ at Pond Barn Cottages.

4.5.13 If there is an overlap between the early phase of the reservoir earthworks (at which time, earthmoving plant would be at ground level and not acoustically shielded by the reservoir topography) and the two village bypass works phase focusing on pavements (expected to be the period of highest sound emission), then there is the potential for a significant cumulative effect. In the event that both construction works were to occur simultaneously at a level which would result in the overall noise level becoming significant, then additional mitigation measures such as changing work phasing or methodology or providing additional local screening, in accordance with the **CoCP** (Doc Ref. 8.11), would be used to ensure that the combined level is **not significant**.

4.5.14 Operational noise from the use of the reservoir would be lower than the noise during the construction phase and, hence, the potential cumulative effects would be less. If the construction of the reservoir were to occur at the same time as the operation of the road, there is the potential for cumulative effects, although these sources are different in character and would be perceived differently. There is no guidance or standard to determine how they would combine. Based on professional judgement, bearing in mind the relatively short duration over which these two sources might occur simultaneously and the likely levels of noise from each, the overall cumulative effect is considered to be **not significant**.

Cumulative effects with Yoxford roundabout

4.5.15 Cavan Cottage (High Street, Yoxford) has approval for a dwelling within its curtilage. High levels of noise do not normally arise from a single property construction and construction noise level from Yoxford roundabout is predicted to be **not significant**. Therefore, dwellings close to Cavan Cottage would not be expected to experience significant cumulative effects from noise were the two schemes to occur simultaneously. Operational noise from the

use of the housing would be lower than the noise during the construction phase and, hence, the potential cumulative effects with the construction of Yoxford roundabout would be lower, and **not significant**. Similarly the low operational noise from the housing development is not expected to give rise to a greater cumulative effect once Yoxford roundabout is operational.

Cumulative effects with the northern park and ride

4.5.16 The development of land between Station Garage and Railway Cottage, Main Road, Darsham into an 82 bedroom hotel with car parking and associated works may potentially be constructed at the same time as the construction or operation of the northern park and ride site. Predicted noise from all construction phases would be either minor or negligible at the closest receptor to the hotel, as discussed under Receptor C in **Volume 3, Chapter 4** of the **ES**. Although it can reasonably be assumed that levels of noise from the construction of the hotel would be controlled so that it did not result in a significant effect, there is the potential for the two noise sources to combine to produce a cumulative effect which would be significant. If both construction works are to occur simultaneously at a level which would result in the overall noise level becoming significant, then additional mitigation measures would be implemented such as changing work phasing or methodology or providing additional local screening in accordance with the **CoCP** (Doc Ref. 8.11), to ensure that the combined level would be **not significant**.

4.5.17 Operational noise from both the park and ride and the use of the hotel would be lower than the noise during the construction phase and, hence the potential cumulative effects would be lower and would be **not significant**.

4.6 Air Quality

a) Methodology

i. Zone of influence

4.6.1 The study area considered for air quality receptors covers the combined study areas for construction dust and transport emissions effects, as detailed in **Volume 1, Appendix 6H** of the **ES**. Therefore, the study area for air quality effects includes 200m from the A12 between Lowestoft to Ipswich, the B1122 between A12 and 500m from main development site and associated developments.

ii. Schemes with the potential for cumulative air quality effects

4.6.2 The short-listed developments within the ZOI that may potentially contribute to cumulative air quality effects include:

- development of residential units on land east of Abbey Road (planning application DC/16/1322/OUT, ID 30);
- development of residential units at the land at Orwell Green (planning application DC/18/4525/SCO, ID 337);
- development of residential and school units at the land south and east of Adastral Park (planning application DC/17/1435/OUT, ID 356); and
- Scottish Power Renewables projects East Anglia ONE North (planning application DC/17/4883/SCO, ID 13) and East Anglia TWO (planning application DC/17/4884/SCO, ID 14).

4.6.3 As described in **section 4.4**, construction road traffic associated with other large-scale developments, including Scottish Power developments East Anglia ONE North and East Anglia TWO, is included in the 'with development' modelled assessment scenarios for 2023 (Sizewell C early years) and 2028 (Sizewell C peak year of construction). The road traffic emissions assessment for the 'with development' scenarios, therefore includes the potential cumulative effects of these schemes.

4.6.4 East Anglia THREE is not included as the timing of construction is not expected to overlap with the peak construction scenarios of the Sizewell C Project, and where it does overlap with phases of the Sizewell C Project, it is not expected to affect transport emissions more than the other two East Anglia ONE North and East Anglia TWO Renewables projects. All other non-Sizewell C developments are scoped out of the assessment as they are not expected to generate transport emissions or construction dust than would have a cumulative effect on air quality when combined with emissions associated with the Sizewell C Project.

iii. General methodology

4.6.5 Particulate matter and dust generated from construction activities of the short-listed developments combined with construction dust resulting from construction of developments in the Sizewell C Project is not expected to have the potential to result in cumulative impacts on air quality at sensitive

receptors, due to their distance, and the level of construction dust emissions predicted to arise, from all Sizewell C Project development sites which are considered to be **not significant**. Therefore, the cumulative effects on air quality arising from construction dust is not assessed further in this chapter.

4.6.6 The construction phase traffic associated with these developments has the potential to result in cumulative impacts on air quality at sensitive receptors.

4.6.7 Sensitive receptors which could potentially experience cumulative effects relating to air quality generated during construction and operation of the main development site and associated developments in combination with the short-listed non-Sizewell C schemes include high sensitivity human health receptors, for example residential properties, schools and hospitals, within 200m of the affected road network.

4.6.8 Representative receptors sensitive to changes in transport emissions have been selected adjacent to roads affected by the proposed developments of the Sizewell C Project and cumulative developments. The locations of these receptors are provided in **Table 4.6** along with label codes that identify the receptor locations illustrated in **Figure 12B.6** of the Transport Emissions Assessment provided in **Volume 2, Appendix 12B** of the **ES**.

Table 4.6: Air Quality Cumulative Receptor locations

Label Code	Relevant Location
BC	Residential properties on A146 Loddon - Beccles - Worlingham.
	Residential properties on A145 Beccles - Brampton.
	Residential properties on B1127 Worlingham - Hulver.
BK	Residential properties on A14 Trimley St Martin - Bucklesham - Nacton.
	Residential properties on A12 Bucklesham - Martlesham.
FR	Residential properties on B1119 Saxtead Green - Framlingham.
	Residential properties on A1120 Dennington.
	Residential properties on B1117 Ashfield Green - Laxfield.
HS	Residential properties on A144 Halesworth - Darsham.
IP	Residential properties on A14 Nacton - Belstead.
	Residential properties on A12 Holton St Mary - Washbrook.
	Residential properties on A1071 Sproughton - Ipswich.
	Residential properties on A1156 Whitton.
	Residential properties on A1022 - A1156 Ipswich centre.

Label Code	Relevant Location
	Residential properties on A1214 Ipswich - Kesgrave - Martlesham.
KS	Residential properties on A12 Kessingland - Wrentham.
	Residential properties on B1127 Henstead - Wrentham.
LE	Residential properties on B1122 Theberton - Leiston - Aldringham - Aldeburgh.
	Residential properties on Lover's Lane.
	Residential properties on B1119 Leiston.
	Residential properties on B1069 Leiston - Coldfair Green - Friston.
	Residential properties on King George's Avenue - Sizewell Gap.
LW	Residential properties on A1144 Lowestoft.
	Residential properties on A1117 Bridge Road - Cotmer Road - Elm Tree Road.
	Residential properties on B1384 Stadbroke Road.
	Residential properties on A12 Tom Crisp Way - Bloodmoor Road.
	Residential properties on A47/Denmark Road.
ND	Residential properties on A14 Claydon - Needham Market.
	Residential properties on A140 Needham Market - Earl Stonham.
	Residential properties on B1078 Needham Market - Coddenham - Otley.
	Residential properties on B1079 Otley - Helmingham.
SX	Residential properties on A12 Kelsale - Saxmundham - Stratford St Andrew.
	Residential properties on B1119 Rendham Road.
	Residential properties on B1121 High Street.
	Residential properties on A1094 Benhall - Church Common.
	Residential properties on B1069 Church Common - Snape - Tunstall.
SW	Residential properties on A1095 Southwold.
	Residential properties on A12 Wangford - Blythburgh.
	Residential properties on A145 Henham - Blythburgh.
WB	Residential properties on A1152 Melton.
	Residential properties on B1438 Melton - Woodbridge - Martlesham.
	Residential properties on Top Street - Main Road, Martlesham.
	Residential properties on A12 Martlesham - Woodbridge.
WM	Residential properties on A12 Marlesford - Lower Hacheston - Ufford.
	Residential properties on B1078 Wickham Market - Charsfield - Clopton.

Label Code	Relevant Location
	Residential properties on B1079 Clopton - Otley.
	Residential properties on B1438 Wickham Market - Pettistree.
YX	Residential properties on A12 Darsham - Yoxford.
	Residential properties on A1120 Hemp Green - Yoxford.
	Residential properties on B1122 Yoxford - Middleton.
	Residential properties on B1125 Middleton - Westleton.
	Residential properties on New road - Yoxford - Middleton.

4.6.9 Assessments of potential cumulative effects resulting from transport emissions related to the Sizewell C Project and non-Sizewell C developments was undertaken for the following scenarios:

- early year 2023 average day (2023 AD Cumulative) scenario with short-listed non-Sizewell C developments and Sizewell C proposed developments under construction;
- peak year 2028 average day (2028 AD Cumulative) scenario with short-listed non-Sizewell C developments, peak construction of the Sizewell C main development site and operation of associated developments; and
- peak year 2028 busiest day (2028 BD Cumulative) scenario with short-listed non-Sizewell C developments, peak construction of the Sizewell C main development site and operation of associated developments.

4.6.10 Concentrations of pollutants nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) based on traffic data for these scenarios provided in the **Transport Assessment** (Doc Ref. 8.5) were predicted following the methodology presented in **Volume 2, Appendix 12B** of the **ES**. These concentrations were then used to determine the potential cumulative effects on air quality at sensitive receptors, resulting from the Sizewell C Project and other developments, using effect descriptors as described in **Volume 1, Appendix 6H** of the **ES**.

b) Assessment of potential cumulative effects during construction

i. Assessment of potential cumulative effects during early years of construction (2023)

4.6.11 Assessment has been carried out of the potential air quality effects resulting from transport emissions associated with the plans and developments on the short-list and early year (2023) construction of the Sizewell C main development site and associated developments. Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for individual representative receptors during the 2023 early year cumulative scenario are presented in **Table 1.1** to **Table 1.3** of **Appendix 4B** to this chapter.

4.6.12 The predicted change in impacts from transport emissions for the cumulative 2023 early year scenario compared to the 2023 reference case scenario would have a 'negligible' effect at most receptors. A limited number of receptors would experience beneficial effects on local air quality that would be 'minor'. The overall effects resulting from transport emissions associated with the construction of the main development site and associated developments, combined with effects from transport emissions associated with the short-listed non-Sizewell C developments, would be **not significant** for all sensitive receptors within the study area. No further mitigation above that described in **Volume 1, Chapter 6** of the **ES** is required.

ii. Assessment of potential cumulative effects during peak of construction of the main development site (2028)

4.6.13 Assessment has been carried out of the potential air quality effects resulting from the plans and developments on the short-list, peak year (2028) average and busiest construction of the Sizewell C main development site and operation of the associated developments. Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for individual representative receptors during the 2028 average day cumulative scenario are presented in **Table 1.4** to **1.6** of **Appendix 4B** of this chapter. Predicted NO_2, PM_{10} and $PM_{2.5}$ concentrations for individual representative receptors during the 2028 busiest day cumulative scenario are presented in **Table 1.7** to **Table 1.9** of **Appendix 4B** of this chapter.

4.6.14 The predicted change in impacts from transport emissions for the cumulative 2028 average day scenario compared to the 2028 reference case scenario would have a 'negligible' effect at most receptors. A limited number of receptors would experience beneficial effects on local air quality that would be 'moderate'. The overall effects resulting from transport emissions associated with the construction of the main development site and operation

of associated developments, combined with effects from transport emissions associated with the short-listed non-Sizewell C schemes, would be **not significant** for all sensitive receptors within the study area. No further mitigation above that described in **Volume 2, Chapter 12** of the **ES** is required.

4.6.15 The predicted change in impacts from transport emissions for the cumulative 2028 busiest day scenario compared to the 2028 reference case scenario would have a 'negligible' effect at most receptors. A limited number of receptors would experience beneficial effects on local air quality that would be 'moderate'. A limited number of receptors would experience 'minor' or 'moderate' adverse effects on local air quality which represents a small number of properties along the A12 and the B1122 in Yoxford but the overall air quality expected at these locations would not exceed air quality objective values, as set out in **Volume 1, Appendix 6H** of the **ES**. The overall effects resulting from transport emissions associated with the construction of the main development site and operation of associated developments, combined with effects from transport emissions associated with the short-listed non-Sizewell C schemes, would be **not significant** for all sensitive receptors within the study area. No further mitigation above that described in **Volume 1, Chapter 6** of the **ES** is required.

c) Assessment of potential cumulative effects during operation of Sizewell C (2034)

4.6.16 As the potential cumulative effects on air quality are only expected during construction of the short-listed non-Sizewell C developments in **section 4.6a** of this chapter, no cumulative effects are expected during operation of Sizewell C as all construction for the listed non-Sizewell C developments will be complete.

4.7 Landscape and Visual

a) Methodology

i. Zone of Influence

4.7.1 The assessment of the landscape and visual cumulative effects has been undertaken in accordance with the landscape and visual assessment methodology provided in **Volume 1, Appendix 6I** of the **ES**. The landscape and visual assessment utilises a study area of 15km from the boundary of the Sizewell C Project for major infrastructure projects (i.e. those going through the Development Consent Order (DCO) process), 5km from the boundary of the Sizewell C Project for major developments (i.e. those

requiring EIA) and 1km from the boundary of the Sizewell C Project for smaller scale development. These distances are derived from the overall study area for the main development site, the extent of likely significant effects for the main development site, provided in **Volume 2**, **Chapter 13** of the **ES**, and the maximum extent of likely significant effects for the associated development sites – see **Volumes 3** to **9**, **Chapter 6** of the **ES**. Beyond this, any other development in combination with the Sizewell C Project would be unlikely to give rise to any significant effects on landscape or visual receptors due to the distance reducing the perceived scale and massing of the proposed built elements and associated operational elements.

4.7.2 In addition, where potential cumulative schemes are located within existing built-up areas, replace existing similar development or would be separated from the Sizewell C Project by intervening landform, built form or vegetation, these have not been considered further as part of the assessment of cumulative effects.

ii. General Methodology

4.7.3 There are some differences between the landscape and visual methodology and the generic method reported in **Volume 1, Chapter 6** of the **ES**, to ensure that the method is appropriate for the assessment of landscape and visual effects. As set out in **Volume 1, Appendix 6I** of the **ES,** the generic method considers 'major' and 'moderate' effects to be significant whereas the landscape and visual methodology describes significance ratings as indicating a 'sliding scale' of the relative importance of the effect, with major being the most important and minimal being the least. Effects that are major-moderate or major are considered to be significant in the landscape and visual assessment. Effects of moderate significance or less are *"of lesser concern"* as discussed in Guidelines for Landscape and Visual Impact Assessment, 3rd edition, para 3.35 (Ref. 4.8).

4.7.4 Cumulative effects are assessed on the same groups of landscape, seascape and visual receptors as the assessment of the main development site, provided in **Volume 2**, **Chapter 13** of the **ES**, and the associated development sites - see **Volume 3** to **9**, **Chapter 6** of the **ES**. Landscape and visual receptors that are considered to receive effects of low-negligible or negligible magnitude (both localised and overall) from the Sizewell C Project are not included in this assessment, as an effect of such low magnitude manifestly adds nothing or very little regardless of the effects of other proposals. If significant cumulative effects arise on those receptors, they would be as a result of other developments and as such are not relevant for consideration as part of this assessment.

b) Assessment of potential cumulative effects during construction

i. Assessment of potential cumulative effects during early years of construction (2023)

4.7.5 During early years of construction of the main development site and the removal and reinstatement phase, cumulative landscape and visual effects may arise in-combination with the following non-Sizewell C schemes (should they occur at the same time):

- East Anglia ONE North Offshore Windfarm (ID 13) – Tier 1 certainty. Application for development consent was submitted in October 2019, with the proposals showing the closest proposed wind turbine approximately 51km offshore from Sizewell. Landfall is shown to be north of Thorpeness and an underground cable route running south of Leiston to a grid connection at Grove Wood, south east of Saxmundham. East Anglia ONE North ES indicates the realistic earliest start date of onshore construction works to be 2023, with construction anticipated to take approximately 3 years and post construction restoration approximately 1 year.

- East Anglia TWO Offshore Windfarm (ID 14) – Tier 1 certainty. Application for development consent was submitted in October 2019, running in parallel with East Anglia ONE North and using the same onshore proposals. The closest proposed wind turbine would be located approximately 35km offshore from Sizewell. East Anglia TWO ES indicates the realistic earliest start date of onshore construction works to be 2023, with construction anticipated to take approximately 3 years and post construction restoration approximately 1 year.

- Nautilus Interconnector (ID A111) – Tier 3 certainty. A proposal to build a high voltage direct current transmission cable between East Suffolk and Belgium. The project is at an early stage, but the current preferred option is for landfall to be in the Leiston area. Installation may commence in 2026 with connection in 2028.

- Eurolink Interconnector (ID A112) – Tier 3 certainty. A proposal to build a high voltage direct current transmission cable between the UK and the Netherlands. The project is at an early stage, but the current

preferred option is for landfall to be in the Leiston area. Likely to connect in 2025.

- Greater Gabbard extension (A113) – Tier 3 certainty. A proposal to expand the Greater Gabbard offshore wind farm. The windfarm would be located 27km from the Suffolk coast. Cable landfall is planned at Sizewell, adjacent to the Greater Gabbard landfall site. The Crown Estate announced that the scheme would progress to the award of development rights in August 2019.

- Galloper Extension offshore windfarm (A114) – Tier 3 certainty. Expansion of the Galloper offshore windfarm. The windfarm would be located further from the coast than the existing windfarm and the proposed Greater Gabbard extension. It is anticipated that cable landfall would also be at Sizewell, adjacent to the Greater Gabbard landfall site. The Crown Estate announced that the scheme would progress to the award of development rights in August 2019.

- Felixstowe Road, Nacton (A119) – Tier 3 certainty. An employment allocation shown in the draft East Suffolk Local Plan. The land is identified for a high quality business park. Access to the site will be required from Felixstowe Road. The allocation has not yet been adopted.

- Innocence Farm, Trimley St Martin (A125) – Tier 3 certainty. An employment allocation shown in the draft East Suffolk Local Plan. A large-scale employment allocation of approximately 67 hectare (ha) is identified for port related businesses and operations to support the continued viability of the Port of Felixstowe. The allocation has not yet been adopted.

4.7.6 Application for development consent for East Anglia THREE Offshore Windfarm (ID 366; 575) was approved in August 2017, with a non-material change approved in June 2019. Application for development consent for the cable route was approved in April 2019. The proposals show the closest proposed wind turbine approximately 69km offshore and landscape and visual effects of the offshore components of the scheme were scoped out of detailed assessment within the East Anglia THREE ES. Landfall is shown to be north east of Felixstowe at Bawdsey and an underground cable route is shown running west, then northwards between Ipswich and Woodbridge, and

north of Ipswich to a grid connection west of Ipswich at Bramford. Construction activities could overlap between the East Anglia THREE cable run and the FMF. However, as intervening landform, built form and vegetation would separate the East Anglia THREE cable run from the Sizewell C Project, it has not been considered further as part of the assessment of cumulative effects.

4.7.7 Sensitive receptors, as identified in **Volume 2**, **Chapter 13** and **Volumes 3** to **9**, **Chapter 6** of the **ES** which could potentially experience cumulative landscape and visual effects generated during the early years of construction in combination with the short-listed non-Sizewell C schemes include the following:

- Ancient Estate Claylands Landscape Character Type (LCT) (high-medium sensitivity).
- Coastal dunes and shingle ridges LCT (high sensitivity).
- Estate Sandlands LCT (medium sensitivity).
- Visual Receptor Group 12: Minsmere to Sizewell Coast (high-medium sensitivity).
- Visual Receptor Group 15: Sizewell Belts (high-medium sensitivity).
- Visual Receptor Group 18: Knodishall and Aldringham (high-medium sensitivity).
- Visual Receptor Group 19: Aldringham Common and The Walks (high-medium sensitivity).
- Visual Receptor Group 20: Sizewell to Thorpeness Coast (high-medium sensitivity).
- Freight Management Facility Visual Receptor Group 1, 4 and 6 (high-medium sensitivity).
- Suffolk Coast path (high sensitivity).

- Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) (high sensitivity).

- Suffolk Heritage Coast (high sensitivity).

4.7.8 All other receptors have been excluded from detailed assessment because there would be no interaction between the effects of the Sizewell C Project and other proposals due to intervening landform, built form or vegetation, or because effects resulting from the Sizewell C Project alone would be of such low magnitude that they would not interact with the effects of other proposals.

4.7.9 Effects on the listed receptors would occur as a result of the construction of the Sizewell C Project. The construction of the cable route and the substation elements of East Anglia ONE North and East Anglia TWO, Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension offshore windfarm, should they occur at the same time as the early years construction of the main development site, are also likely to have landscape or visual effects on some receptors. However, the addition of localised short to medium-term construction effects from these other proposals, which would range from large to small scale, would not result in an increase to the significance of the effects. Cumulative effects for the following receptors would remain as described in relation to project-wide effects in **Chapter 3** of this volume or as described in **Volume 2**, **Chapter 13** of the **ES** where no project-wide effects have been anticipated:

- Ancient Estate Claylands LCT – combined major-moderate adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

- Coastal dunes and shingle ridges LCT – combined major adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

- Estate Sandlands LCT – combined major-moderate adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

- Visual Receptor Group 12: Minsmere to Sizewell Coast – combined major adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

- Visual Receptor Group 15: Sizewell Belts – combined major-moderate adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

- Freight Management Facility Visual Receptor Groups 1, 4 and 6 – combined major-moderate, moderate and slight adverse effects respectively, with only effects on Visual Receptor Group 1 considered to be **significant**. The addition of the other proposals would not result in an increase to the significance of the effects.

- Suffolk Coast path – combined major to major-moderate adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

- Suffolk Coast and Heaths Area AONB – combined major adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

- Suffolk Heritage Coast – combined major adverse **significant** effects from the Sizewell C Project during construction. The addition of the other proposals would not result in an increase to the significance of the effects.

4.7.10 Effects on Visual Receptor Group 18: Knodishall and Aldringham would currently only occur as a result of the construction of the main development site. However, the construction of the cable route and substation elements of East Anglia ONE North and East Anglia TWO are also likely to be visible from areas within this receptor group. Whilst the receptor group would experience slight adverse effects from relatively distant views of the construction works at the main development site, as described within **Volume 2**, **Chapter 13** of the **ES**, the addition of the localised, large scale, medium-term construction effects from these other proposals located within the receptor group would

result in effects of medium magnitude, major-moderate adverse and therefore considered to be **significant**. The significant cumulative effect on this visual receptor group arises primarily as a result of the combined construction effects of the East Anglia ONE North and East Anglia TWO cable route and substations. The ESs for these schemes indicate that mitigation has been embedded into the two schemes to reduce landscape and visual effects. However, in the medium-term **significant** visual effects are anticipated during the early years of construction of the Sizewell C Project. These effects would reduce following the completion of the East Anglia ONE North and East Anglia TWO cable route and substations, to become **not significant** over time.

4.7.11 Effects on Visual Receptor Group 19: Aldringham Common and The Walks would currently only occur as a result of the construction of the main development site. However, the construction of the landfall and cable route elements of East Anglia ONE North, East Anglia TWO, Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension offshore windfarm, as well as potentially the substations for Greater Gabbard extension and Galloper Extension offshore windfarm are also likely to be visible from areas within this receptor group. Whilst the receptor group would experience moderate adverse effects from views of the construction works at the main development site, as described within **Volume 2**, **Chapter 13** of the **ES**, the addition of the localised, large scale, short to medium-term construction effects from the cumulative schemes located within the receptor group would result in effects of medium magnitude, major-moderate adverse and therefore considered to be **significant**. As there is less certainty about the proposals for Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension, given their stage in the planning process, it is anticipated that the significant cumulative effect on this visual receptor group arises primarily as a result of the combined construction effects of the East Anglia ONE North and East Anglia TWO cable route and landfall, including the presence of construction compounds (referred to as construction consolidation sites). The ESs for these schemes indicate that mitigation has been embedded into the two schemes to reduce landscape and visual effects. However, in the medium-term **significant** visual effects are anticipated during the early years of construction of the Sizewell C Project. These effects would reduce following the completion of the East Anglia ONE North and East Anglia TWO cable route and landfall, to become **not significant** over time.

4.7.12 Effects on Visual Receptor Group 20: Sizewell to Thorpeness Coast would currently only occur as a result of the construction of the main development

site. However, the construction of the landfall and cable route elements of East Anglia ONE North and East Anglia TWO, as well as potentially elements of Greater Gabbard extension, Galloper Extension offshore windfarm, Nautilus Interconnector, Eurolink Interconnector, are also likely to be visible from areas within this receptor group. Whilst the receptor group would experience moderate adverse effects from views of the construction works at the main development site, as described within **Volume 2**, **Chapter 13** of the **ES**, the addition of the localised, large scale, short to medium-term construction effects from the cumulative schemes located within the receptor group would result in effects of medium magnitude, major-moderate adverse and therefore considered to be **significant**. As there is less certainty about the proposals for Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension offshore windfarm, given their stage in the planning process, it is anticipated that the **significant** cumulative effect on this visual receptor group arises primarily as a result of the combined construction effects of the East Anglia ONE North and East Anglia TWO landfall and cable route, including the presence of construction compounds (referred to as construction consolidation sites). The ESs for these schemes indicate that mitigation has been embedded into the two schemes to reduce landscape and visual effects. However, in the medium-term **significant** visual effects are anticipated during the early years of construction of the Sizewell C Project. These effects would reduce following the completion of the East Anglia ONE North and East Anglia TWO landfall and cable route, to become **not significant** over time.

ii. Assessment of potential cumulative effects during peak construction of the main development site (2028)

4.7.13 During the peak of construction of the main development site (when all associated developments are operational and the main development site is under construction), cumulative landscape and visual effects may arise in-combination with the following non-Sizewell C schemes:

- East Anglia ONE North offshore windfarm – Tier 1 certainty. Potential for ongoing overlap of construction activities if construction period extends or start delays from anticipated 2023 start.

- East Anglia TWO offshore windfarm – Tier 1 certainty. Potential for ongoing overlap of construction activities if construction period extends or start delays from anticipated 2023 start.

- Nautilus Interconnector – Tier 3 certainty. Potential for ongoing overlap of construction activities.
- Eurolink Interconnector – Tier 3 certainty. Potential for ongoing overlap of construction activities.
- Greater Gabbard extension – Tier 3 certainty. Potential for ongoing overlap of construction activities.
- Galloper Extension offshore windfarm – Tier 3 certainty. Potential for ongoing overlap of construction activities.
- Felixstowe Road, Nacton – Tier 3 certainty. Potential for ongoing overlap of construction activities.
- Innocence Farm, Trimley St Martin – Tier 3 certainty. Potential for ongoing overlap of construction activities.

4.7.14 These schemes remain relevant to the cumulative assessment during the peak of construction of the main development site as the construction periods are likely to remain ongoing for at least some of this time period and for the same selection criteria as the early years of construction.

4.7.15 Sensitive receptors that could potentially experience cumulative landscape and visual effects generated during the peak of construction in combination with the short listed non-Sizewell C schemes would remain the same as for the early years of construction. For all of the identified receptors cumulative impacts would remain broadly the same as for the early years of construction, albeit that for some receptors effects would result from the operation of associated development sites rather than their construction.

c) Assessment of potential cumulative effects during operation

4.7.16 During the operation of the main development site, cumulative landscape and visual effects may arise in-combination with the following non-Sizewell C schemes:

- East Anglia ONE North offshore windfarm. Potential for cumulative effects with operation of substations. Construction is anticipated to have been completed by this stage of the Sizewell C Project, with the landfall and cable route restored.

- East Anglia TWO offshore windfarm. Potential for ongoing cumulative effects with operation of substations. Construction is anticipated to have been completed by this stage of the Sizewell C Project, with the landfall and cable route restored.

4.7.17 Construction of the majority of the other non-Sizewell C schemes considered for this assessment is assumed to be complete by the operational phase of the main development site and the landfall, cable and substation works are assumed to result in minimal landscape and visual effects during the operational phase of the other non-Sizewell C schemes, based on the indication that the sub stations for Greater Gabbard extension and Galloper Extension would be located in proximity to their existing substations. The exception to this would be the proposed business park at Felixstowe Road, Nacton and the Innocence Farm employment site, which would be operational by this stage but would no longer be in the vicinity of any aspect of the Sizewell C project, since the FMF would have been removed by this stage.

4.7.18 Sensitive receptors which could potentially experience cumulative landscape and visual effects generated during operation in combination with the short-listed non-Sizewell C schemes include the following:

- Ancient Estate Claylands LCT (high-medium sensitivity).
- Estate Sandlands LCT (medium sensitivity).

4.7.19 All other receptors have been excluded from detailed assessment because there would be no interaction between the effects of the Sizewell C Project and other proposals or effects resulting from the Sizewell C Project alone would be of such low magnitude that they manifestly add nothing or very little regardless of the effects of other proposals.

4.7.20 Effects on these receptors would occur as a result of the operation of the Sizewell C Project. The construction of the cable route and the construction and eventual operation of substation elements of East Anglia ONE North and East Anglia TWO. However, the addition of localised short to medium-term construction effects from these proposals, which would range from large to small scale, would not result in an increase to the significance of the effects. Cumulative effects for the Estate Sandlands LCT would remain as described in relation to project-wide effects in **Chapter 3** of this volume or as described in **Volume 2**, **Chapter 13** of the **ES,** where no project-wide effects are anticipated.

4.7.21 During this stage of the Sizewell C Project, landscape effects on the Ancient Estate Claylands LCT would currently only occur in relation to the operation of the main development site and Sizewell link road. However, the operation of the remaining non-Sizewell C schemes would also result in the presence of additional built development within the same LCT. Whilst the LCT would experience minimal adverse effects from the operation of the Sizewell C Project, as described within **Volume 2**, **Chapter 13** of the **ES**, the additional presence of the East Anglia ONE North and East Anglia TWO substations would result in localised, medium scale, medium to long-term construction effects in a separate part of the LCT. This would increase the extent of the LCT affected by development. These effects would be of medium magnitude, moderate adverse and therefore considered to be **not significant**.

4.8 Terrestrial Ecology and Ornithology

a) Methodology

i. Zone of Influence

4.8.1 The terrestrial ecology and ornithology cumulative assessment outlines the cumulative effects from the proposed development in combination with the effects from other non-Sizewell C schemes. Schemes have been scoped into this assessment based upon the likely ZOI of other consented schemes in relation to the identified Important Ecological Features (IEFs). Only those schemes with the potential to impact these IEFs are assessed. The ZOI has been based on a 20km radius from the Sizewell C main development site and 5km from associated development. This radius has been included given the presence of more mobile terrestrial species in the locality and the nature of the surrounding landscape and planning applications proposed.

4.8.2 A review of nearby consented schemes has been undertaken in the consideration of cumulative effects within 20km of the Sizewell main development site. These schemes are detailed in **Appendix 1A** of **Volume 10** of the **ES** and presented in **Figure 1**. Whilst construction and operational phase dates are not always available, the worst-case has been assumed and that is that the construction phase would coincide with the construction phase of the Sizewell schemes. Whilst one large scale housing development (over 2,000 homes) (ID 337) is planned, it is located more than 30km from the main development site at Foxhall, Suffolk. Given the distance of this development, it has not been considered further within this assessment. The requirements as part of consenting would stipulate the provision of suitable alternative natural green space as stipulated in the Suffolk Coastal District Local Plan at Final Draft Plan Stage (Ref. 4.9) and the need for any specific ecological mitigation.

4.8.3 The three offshore windfarms of East Anglia ONE, TWO and THREE have been reviewed as part of this assessment and it is not considered likely that any cumulative effect would arise on the IEFs which are considered within the terrestrial ecology assessment, in combination with these schemes. An assessment of these schemes in combination with Sizewell C and the effects on marine ecology has been undertaken and can be found in **section 4.15** of this chapter, Marine Ecology and Water Quality.

ii. General methodology

4.8.4 As part of this assessment, a review has been carried out of the Local Plan Habitats Regulations Assessment (HRA) (Ref. 4.10) which has been produced specifically for Suffolk District Council in accordance with the Town and Country Planning (Local Planning) (England) Regulations 2012. The Local Plan HRA forms part of the relevant European legislation requirements associated with the Habitats Directive 1992 and the Wild Birds Directive 2009, which are transposed into domestic legislation through the Conservation of Habitats and Species Regulations 2017 (Ref. 4.11). The single approach used by the five Suffolk local planning authorities has resulted in a review of all proposed developments in Suffolk associated with housing and mitigation measures have been identified, for example the provision of suitable alternative natural greenspaces. Under the suitable alternative natural greenspaces approach, it is anticipated that a minimum of 8ha per 1000 residents will be available based on 2.4 residents per dwelling, unless local information suggests otherwise. This would help to reduce potential increases in pressures of visitor numbers, on a large number of designated sites. Such approaches have been given further consideration in the assessment below.

4.8.5 The potential for non-Sizewell C schemes to impact European Designated Sites is considered within the separate Sizewell C **Shadow HRA Report** (Doc Ref. 5.10). No instances are identified of the Sizewell C proposals, acting alongside another project, to create an 'adverse effect on integrity' on any European Designated Site. It is therefore concluded here that **no significant** adverse effects would arise on European Designated Sites, as a result of the Sizewell C proposals acting alongside another project.

b) Assessment of potential cumulative effects during construction

i. Early years

4.8.6 The following non-Sizewell C schemes have been scoped into the early years assessment (which are assumed to be years 1-3):

- Land at the rear of St Margaret's Crescent, Leiston, Suffolk (planning application DC/16/2104/OUT, ID 28). Erection of up to 77 new homes with associated access, infrastructure, landscaping and amenity space (all matters to be reserved except for access).

- Johnsons Farm, Saxmundham Road, Leiston, Suffolk (planning application DC/16/1961/OUT, ID 29). An outline planning application for up to 187 dwellings to include car parking, open space provision with associated infrastructure and access.

- Land East of Abbey Road, Leiston, Suffolk (planning application DC/16/1322/OUT, ID 30). Outline Application - 100 new residential units (C3) with employment floorspace (B1) (approx. 1000m^2) and family orientated public house / restaurant (A3/A4) (approx. 770m^2).

- Part Land South West Aldringham House, Aldeburgh Road, Aldringham Cum Thorpe, Suffolk (planning application DC/18/2325/FUL, ID 47).

- Land Between Station Garage and Railway Cottage, Main Road, Darsham, Suffolk (planning application DC/14/0420/OUT, ID 89). Erection of 82-bedroom hotel, car parking and associated works.

4.8.7 Where IEFs only occur in the Sizewell C schemes and are not considered to be directly impacted by the non-Sizewell C schemes, these IEFs have been scoped out of this Cumulative Effects Assessment.

4.8.8 The early stages of construction are anticipated to comprise activities such as mobilisation and enabling works (including the setting up of the site compound), vegetation and site clearance (including soil stripping) and the installation of the pre-earthworks drainage as well as the commencement of earthworks.

4.8.9 The construction phases of the non-Sizewell C schemes identified may, alongside the Sizewell C proposals, result in some cumulative habitat loss and fragmentation as well as increased levels of disturbance which on a cumulative basis may affect IEFs.

4.8.10 The IEFs which are identified are drawn from the **ES** chapters which have been produced for all of the Sizewell C elements. For the purposes of cumulative assessment, the highest level of value / sensitivity assigned for a particular IEF has been applied, thereby providing a precautionary assessment.

4.8.11 The IEFs identified are as follows;

- Designated sites, international and national, (including qualifying features) special protection areas (SPA), special area of conservation (SAC), Ramsar Site, and site of special scientific interest (SSSI).
- County wildlife sites (CWS): Sizewell Levels and Associated Areas CWS.
- Breeding birds.
- Farmland birds.
- Great crested newts / amphibians.
- Reptiles.
- Bats.
- Badgers.

4.8.12 These IEFs may experience the following cumulative impacts:

- habitat loss, damage and fragmentation;
- incidental mortality; and
- disturbance by increased lighting and noise.

4.8.13 During the early years of the construction phase, summarised in **Table 4.7**, farmland birds, breeding birds and bats have been identified as IEFs likely to experience a cumulative effect during this stage of the proposed developments. Reptiles, badgers and great crested newts have been identified as likely to experience a neutral effect which is **not significant**. Therefore, these IEFs are not considered further within this assessment in relation to early construction phase activities. As noted above, **no significant** adverse effects would arise on European Designated Sites, as a result of the Sizewell C proposals acting alongside another project.

Designated sites

4.8.14 For the purpose of this assessment it has been assumed (worst-case) that all site clearance works will commence at the same time for the Sizewell C and non-Sizewell C developments. During the early stages of construction at the main development site, access to the coastal path would be restricted at times and there is ongoing potential for recreational pressure to increase within the surrounding areas. Given the facilities proposed for the Sizewell C workforce and that it is assumed that for the non-Sizewell C developments additional visitor numbers to the area would be limited and subsequently habitat degradation due to nutrient inputs and trampling of vegetation would be negligible. Therefore, the cumulative effects upon the international and nationally designated sites are anticipated to be negligible and therefore **not significant.**

4.8.15 In the case of the CWSs, whilst mitigation provisions have been made and those implemented for the international and nationally designated sites would provide benefit for some of the CWSs, due to the proximity of some of the CWSs to several of the development sites some small-scale additional pressures may occur, given the wider provisions, these are thought to be minor adverse cumulative effects, which are considered to be **not significant**.

Farmland Birds

4.8.16 Site clearance and early construction phase activities for the non-Sizewell C developments will result in the loss of arable habitats used by farmland birds. However, there is likely to be a phased approach to site clearance given the scale of some sites and not all farmland habitats are likely to be cleared in year 1 of construction. The Sizewell C associated development sites would predominately cross arable habitats and when combined with the non-Sizewell C developments, arable habitats for farmland birds would be reduced across Suffolk.

4.8.17 The existing arable habitats which would be lost across the Sizewell C Project are of relatively low value for the farmland bird assemblage, with relatively low densities recorded during survey and the same is likely to be the case for the non-Sizewell C sites. The cumulative effect on the farmland bird assemblage at this period of construction is therefore judged to be to be minor adverse and **not significant**.

Breeding birds

4.8.18 Given the extent of vegetation clearance to be carried out to facilitate the non-Sizewell C developments and means of access, whilst areas within the various application boundaries will be retained, the levels of disturbance will mean that breeding and foraging bird species may be displaced while some may become habituated. The same effects would arise at the Sizewell C main development site and the related associated development sites. Whilst this should not have a significant detrimental effect upon breeding birds in a single locality, when all proposed developments are under construction at the same time a cumulative effect may arise from habitat loss and displacement. Retained habitats in the wider surrounding landscape are extensive and can be expected to support and maintain the relevant bird species although it is likely that they will be displaced from the habitat areas/territories being used prior to the commencement of the early construction phase leading to small local population declines. Given the distribution of the sites and available habitat in the wider landscape and that vegetation clearance works will be undertaken outside of the bird nesting season, the overall cumulative effect is likely to be minor adverse and **not significant**.

Bats

4.8.19 Whilst habitat loss and fragmentation would occur during the early stages of development, boundary features would be retained where practicable and off-sets implemented to avoid valuable habitat areas such as woodland blocks. Mitigation for bats will be provided across all project elements where appropriate and it is assumed, that in order to secure planning consent, all non-Sizewell C developments will need to commit to and implement appropriate, proportionate mitigation. Whilst this should not have a significant detrimental effect upon the local bat assemblage, when all proposed developments are under construction at the same time a cumulative effect may arise from habitat loss and displacement. Retained habitats in the wider surrounding landscape are extensive and can be expected to support and maintain the relevant bat species although it is likely that they will be displaced from the habitat areas being used prior to the commencement of the early construction phase leading to small local population declines. Site clearance activities will be required for all proposed non-Sizewell C developments and temporary construction compounds as well as the Sizewell C elements, all of which are likely to require some security lighting. In the absence of mitigation, species such as bats may be impacted by increases in lighting. Best available techniques and best practicable measures are anticipated to be applied across all proposed developments to manage noise levels. In addition, the Local Planning

Authorities Environmental Health Officer will be engaged as part of the planning process. A number of the proposed non-Sizewell C developments make commitments to the use of a lighting plan and ensuring the appropriate lighting measures are implemented to avoid light-spill and the illumination of landscape corridors which are likely to be used by local wildlife. Mitigation measures associated with lighting are incorporated into all of the Sizewell schemes. Therefore, during the early construction phase, impacts to IEFs in relation to noise and lighting disturbance is anticipated to be **minor adverse** and therefore **not significant**.

General

4.8.20 For all non-Sizewell C developments to receive planning permission and where European Protected Species (EPS) have been confirmed as present, bespoke mitigation strategies and licensing will be required on a site-specific basis to ensure their favourable conservation status. Where other protected species are present, bespoke mitigation strategies will also be required to ensure that there are no legislative constraints. In the event of all early stages of construction phases coinciding, the bespoke mitigation strategies for each non-Sizewell C development and (where appropriate) licensing requirements will ensure the local nature conservation status of these species is maintained, particularly during the site clearance stage to ensure not only suitable, sufficient habitat remains available but also ensure a low risk of incidental mortality. In addition, to help manage construction phase impacts, a Construction Environmental Management Plan (CEMP) will be produced for Sizewell C in accordance with the **Code of Construction Practice (CoCP)** (Doc Ref. 8.11). The CEMPs will align across all of the sites and measures therein as well as measures within the **Outline Landscape and Ecology Management Plan** (**oLEMP**) (Doc Ref. 8.2), EPS licenses and Risk Assessment Method Statements would ensure no net loss of biodiversity on a project-wide basis and to provide wider benefits.

Table 4.7: Cumulative Effects Assessment Summary for Sizewell C and Non-Sizewell C Developments - Early Years Construction Phase

Important Ecological Feature	Sensitivity/Valuation	Residual Effect
Designated sites international and national (including qualifying features) SPA, SAC, Ramsar Site, and SSSI.	International and National/High.	Negligible**, not significant.**
Sizewell Levels and Associated Areas CWS.	County/Medium	Minor adverse, **not significant**.

Important Ecological Feature	Sensitivity/Valuation	Residual Effect
Breeding birds.	Local/Low	Minor adverse**, not significant**.
Farmland birds.	Local/Low	Moderate adverse, **significant.**
Great crested newts / amphibians.	County/Medium	Neutral, **not significant.**
Reptiles	County/Medium	Neutral**, not significant.**
Bats	County/Medium	Minor adverse, **not significant.**
Badgers	Local/Low	Minor adverse, **not significant.**

ii. Peak Construction

4.8.21 At the peak of construction of the Sizewell C main development site (and all Sizewell C associated developments operational) the following schemes are relevant to an assessment of cumulative effects:

- Land to The South of Red House Lane, Leiston, Suffolk (planning application DC/17/1605/FUL).
- Land at the rear of St Margaret's Crescent, Leiston, Suffolk (planning application DC/16/2104/OUT).
- Johnsons Farm Saxmundham Road, Leiston, Suffolk (planning application DC/16/1961/OUT).
- Land East of Abbey Road, Leiston, Suffolk (planning application DC/16/1322/OUT).
- Part Land South West Aldringham House Aldeburgh Road, Aldringham Cum Thorpe, Suffolk (planning application DC/18/2325/FUL).
- Land Between Station Garage and Railway Cottage Main Road, Darsham, Suffolk (planning application DC/14/0420/OUT).

4.8.22 For the purpose of this assessment and given that project timescales have not been defined for all non-Sizewell C developments, it is assumed that all non-Sizewell C developments will be in their operational stages (no ongoing construction impacts). Where there is no potential for significant effects, IEFs have been scoped out of the assessment.

4.8.23 The peak construction phase of the non-Sizewell C developments in-combination with the works at Sizewell are likely to result in some cumulative effects on the identified IEFs. During this time, whilst mitigation measures would have been implemented across all Sizewell C associated development sites and overall should be functional, the landscape design would still be in its early years of establishment and not yet be of maximum value in all instances and some fragmentation effects from construction may still remain before habitats are fully established.

4.8.24 Sensitive receptors which could potentially experience cumulative effects during the peak of Sizewell C construction in combination with the non-Sizewell C schemes include the following:

- Designated sites international and national (including qualifying features) SPA, SAC, Ramsar Site, and SSSI.
- County wildlife sites (CWS) Sizewell Levels and Associated Areas CWS.
- Breeding birds.
- Farmland birds.
- Great crested newts / amphibians.
- Reptiles.
- Bats.
- Badgers.

4.8.25 The IEFs which are identified are drawn from the **ES** chapters which have been produced for all of the Sizewell C elements. For the purposes of cumulative assessment, the highest level of value / sensitivity assigned for a particular IEF, has been applied, thereby providing a precautionary assessment.

4.8.26 These IEFs may experience the following cumulative impacts:

- habitat damage from trampling and increased recreational usage in the local area;
- habitat fragmentation; and
- disturbance by increased lighting and noise.

4.8.27 During the peak of Sizewell C construction, summarised in **Table 4.8**, the habitat loss and fragmentation pressures will remain similar to those identified above during the early years. The vegetation and site clearance works would have been completed and so the risk of incidental mortality would be negligible at this stage. However, additional habitat areas would be removed beneath the footprint of the non-Sizewell C developments. Reptiles, badgers and great crested newts are identified as likely to experience a neutral effect which is **not significant** or have been scoped out. Therefore, these IEFs have not been considered further within this assessment of the Sizewell C construction peak.

Designated sites

4.8.28 For the purpose of this assessment it has been assumed that at the peak of Sizewell C construction, all of the residential developments are operational and properties occupied. By the peak of the construction at the main development site, access to the coastal path would be restricted at times and there is ongoing potential for recreational pressure to increase within the surrounding areas. Through the addition of new housing as well as a hotel in the locality, there is the potential for further increases in visitor numbers and subsequently habitat degradation due to nutrient inputs and trampling of vegetation. However, given the requirement for compensatory recreational areas, the provision of Suitable Alternative Natural Greenspaces as identified as a requirement in the Habitats Regulations Assessment of the Suffolk Coastal District Local Plan at Final Draft Plan Stage (Ref. 4.10), the cumulative effects upon the international and nationally designated sites are anticipated to be neutral and therefore **not significant.**

4.8.29 In the case of the CWSs, whilst mitigation provisions have been made and those implemented for the international and nationally designated sites would provide benefit for some of the CWSs, due to the proximity of some of the CWSs to several of the new development, recreational pressures are still anticipated as well as the risk to local wildlife to predation by domestic animals. Whilst additional pressures are likely to occur, given the wider

provisions, these are thought to be minor adverse cumulative effects, which are considered to be **not significant**.

Breeding Birds

4.8.30 During Sizewell C peak construction, the landscape designs for the associated developments would have started to become established. However, as they would still be in their early stages of development, the habitats would be of relatively limited use to breeding birds. Therefore, some small-scale affects associated with habitat loss would still be experienced. Although the initial site clearance activities and main construction phase for the non-Sizewell C developments and the Sizewell C associated development sites would have been completed, retained vegetated areas are likely to be recolonised by nesting birds disturbance activities resulting in any previous displacement would have ended. During the peak of construction for the Sizewell C main development site, much of the disturbance and increased lighting and noise levels will remain the similar to that of the early years although this would vary across the site. However, a degree of habituation is likely to be achieved by this time. Whilst the non-Sizewell C developments would be anticipated to have been completed by the peak phase of construction as well as the additional development sites being in their operational phase, lighting strategies will have been submitted as part of the planning application and formed part of the development designs to ensure light-spill and the illumination of landscape features is avoided. Therefore, the cumulative effects are anticipated to be much the same as identified during the early years. The additional measures to be implemented including the **CoCP** (Doc Ref. 8.11), identified in **section 4.8.20** above, would remain applicable during this stage of the construction phase of Sizewell C.

Farmland Birds

4.8.31 At this stage, all Sizewell C associated development sites and non-Sizewell C development sites would be operational and all arable habitats beneath the footprint of the various developments would have been lost. The existing arable habitats which would be lost across the Sizewell C Project are of relatively low value for the farmland bird assemblage, with relatively low densities recorded during survey and the same is likely to be the case for the non-Sizewell C sites. The cumulative effect on the farmland bird assemblage at this period of construction is therefore judged to be to be minor adverse and **not significant**.

Bats

4.8.32 During the peak of the Sizewell C main development site construction phase and the operational phase of the associated developments, as well as the non-Sizewell C development, much of the disturbing activities will have been completed. In addition, the landscaping design will be beginning to mature, and the lighting strategies will have been implemented to ensure no long-term illumination of the surrounding landscape features which are likely to be of value to foraging and commuting bats. Safe crossing points will also have been installed where appropriate on the highway infrastructure schemes. The requirement for any bat boxes to have been installed will also have been met and potential roosting opportunities will be available for use. Across all sites, hedgerows and field margins will have been retained where practicable and green spaces incorporated into the non-Sizewell C developments where associated with housing. Whilst at this stage of the construction phase, there will still be disturbance in the vicinity of the Sizewell C main development site, the surrounding landscape would not be subject to activities resulting in substantive disturbance and newly established habitat areas should be available for use by roosting and foraging bats.

4.8.33 Assuming the appropriate mitigation measures are implemented across all developments, and landscape design begins to sufficiently establish, minor adverse cumulative effects are anticipated which are considered **not significant**.

Table 4.8: Cumulative Effects Assessment Summary for Sizewell and Non-Sizewell C Developments – Peak Construction Phase

Important Ecological Feature	Sensitivity/Valuation	Residual Effect
Designated sites international and national (including qualifying features) SPA, SAC, Ramsar Site, and SSSI.	International and National/High	Neutral, **not significant**.
County wildlife sites (CWS) Sizewell Levels and Associated Areas CWS.	County/Medium	Minor adverse, **not significant**.
Breeding birds.	Local/Low	Minor adverse, **not significant**.
Farmland birds.	Local/Low	Minor adverse, **not significant**.

Important Ecological Feature	Sensitivity/Valuation	Residual Effect
Great crested newts / amphibians.	County/Medium	Neutral, **not significant**.
Reptiles	County/Medium	Neutral, **not significant**
Bats	County/Medium	Minor adverse, **not significant**.

iii. Removal and reinstatement of associated development sites

4.8.34 During the later years of construction / commissioning of the main Sizewell C development site, when this is concurrent with the removal and reinstatement phase of some of the associated development sites, the following schemes have been scoped into this cumulative effects assessment:

- Land to The South of Red House Lane, Leiston, Suffolk (planning application DC/17/1605/FUL).
- Land at the rear of St Margaret's Crescent, Leiston, Suffolk (planning application DC/16/2104/OUT).
- Johnsons Farm Saxmundham Road, Leiston, Suffolk (planning application DC/16/1961/OUT).
- Land East of Abbey Road, Leiston, Suffolk (planning application DC/16/1322/OUT).
- Part Land South West Aldringham House Aldeburgh Road, Aldringham Cum Thorpe, Suffolk (planning application DC/18/2325/FUL).
- Land Between Station Garage and Railway Cottage Main Road, Darsham, Suffolk (planning application DC/14/0420/OUT).

4.8.35 Given that only a number of the Sizewell C associated development sites are to be decommissioned and reinstated, this section of the assessment only considers the green rail route, the freight management facility and the Darsham and Wickham park and rides. However, the Sizewell link road, Yoxford roundabout and two village bypass, which would remain permanent

legacy features have not been included as these will remain operational and require no decommissioning. The mitigation implemented in relation to those schemes would be permanent and is assumed to be sufficient and most habitats functional at this stage, although woodland would not be fully functional.

4.8.36 The assessments of potential cumulative effects during the removal and reinstatement of the associated development sites in combination with the continued construction of the main development site albeit in the later stages of its construction phase has assumed that protected species have been excluded from the working areas at the initial construction phase so that no constraints are present during the removal and reinstatement works.

4.8.37 Sensitive receptors which could potentially experience cumulative effects generated during the removal and reinstatement phase of some of the associated development and the later years of the Sizewell Schemes have been presented **Table 4.9**. Sensitive receptors which could potentially experience cumulative effects include the following:

- Designated sites international and national (including qualifying features) SPA, SAC, Ramsar Site, and SSSI.
- County wildlife sites (CWS) Sizewell Levels and Associated Areas CWS.
- Breeding birds.
- Farmland birds.
- Great crested newts / amphibians.
- Reptiles.
- Bats.
- Badgers.

4.8.38 These receptors may experience:

- habitat fragmentation;

- disturbance by increased lighting and noise; and
- habitat reinstatement/ increases in suitable habitat available.

4.8.39 Following the reinstatement of the relevant associated development sites, areas of arable habitat, would be reinstated to a standard equivalent to that available prior to the construction phase. Whilst the various non-Sizewell C developments would be in their operational phase, habitat areas will have been permanently lost to land take of these developments although their landscape plantings would be establishing. The reinstated Sizewell C associated development sites would result in in the availability of habitat areas, mainly of arable land, returning to their pre-construction state (in some instances) across the county which had been temporarily lost over the ten year construction phase whilst in operation. For example, in some instances new ponds will have been created and some of the landscaping design is likely to result in betterment that the some of the habitat types lost prior to the construction phase. Therefore, the cumulative effects are anticipated to be neutral**,** but **not significant** once reinstatement has been completed

Designated Sites

4.8.40 As noted in earlier above, for the purpose of this assessment it has been assumed that at this stage all of the residential developments are anticipated to be operational and properties occupied. By the reinstatement and restoration phases of the Sizewell C associated development sites, the Sizewell beachfront is likely to be fully accessible. In addition, the alternative recreational spaces / Suitable Alternative Natural Greenspaces created to support the residential developments can also be assumed to remain in-situ for the long-term providing more recreational opportunities for local residents and visitors. The cumulative effects upon the international and nationally designated sites are therefore anticipated to be neutral and **not significant.**

4.8.41 As noted above, in the case of the CWSs, whilst mitigation provisions have been made and those implemented for the international and nationally designated sites would provide benefit for some of the CWSs, due to the proximity of some of the CWSs to several of the new development, recreational pressures are still anticipated as well as the risk to local wildlife to predation by domestic animals. Whilst additional pressures are likely to occur, given the wider provisions, these are thought to be minor adverse cumulative effects, which are considered to be **not significant.**

Breeding Birds

4.8.42 Whilst the proposed non-Sizewell C developments and elements of the Sizewell development would result in the permanent loss of arable fields present, the proposed housing developments listed above will ultimately result in a landscape design including planting and green spaces which will be used by breeding birds in the long-term. By this stage, these areas would be expected to be establishing well and so should provide habitats for breeding birds.

4.8.43 During the reinstatement stage for the associated developments, hedgerows and field margins would be retained and although some disturbance to the local breeding bird population is anticipated, the reinstatement works would be a temporary short-term activity. Once completed the sites would be returned to their baseline conditions. Given the short-term and localised disturbance to birds across these sites and the establishment of habitats associated with the non-Sizewell C developments described above, the cumulative effects in relation to breeding birds are anticipated to be minor adverse and **not significant**.

Farmland Birds

4.8.44 As noted for the construction phase above, farmland birds would already have been impacted as arable areas would have been lost beneath the footprint of the Sizewell C associated development sites and the non-Sizewell C sites. However, the reinstatement stage of the associated development would return these areas back to their baseline conditions of arable and pasture farmland and these areas would become available for use by farmland birds again. As hedges would have been retained, these farmland habitats would be relatively rapidly re-established. Although these would be some localised disturbance during the undertaking of these works, a minor adverse cumulative effect is anticipated which is considered to be **not significant**.

Bats

4.8.45 During the reinstatement stage for the Sizewell C associated developments, the non-Sizewell C developments would be fully operational with a landscape design including planting and green spaces which would be expected to be establishing well and so should provide habitats for bats to some degree. At the main development site and at the permanent Sizewell C associated developments, lighting strategies would have also been implemented and dark corridors and safe crossing points suitable for use by bats would be available. Any requirements for alternative roosts would have been installed

and available for use across all of these elements. Whilst during the reinstatement works some disturbance is anticipated, these works would be temporary and short-term. The reinstatement works would return these sites to their baseline condition including the restoration of areas of arable and pasture and foraging habitats for bats, albeit sub-optimal, being restored. Therefore, a minor adverse cumulative effect is anticipated which is **not significant.**

Table 4.9: Cumulative Effects Assessment Summary for Sizewell and Non-Sizewell C Developments – Removal and Reinstatement of Associated Development Sites

Important Ecological Feature	Sensitivity/Valuation	Residual Effect
Designated sites international and national (including qualifying features) SPA, SAC, Ramsar Site, and SSSI.	International and National/High.	Neutral, **not significant**.
County wildlife sites (CWS) Sizewell Levels and Associated Areas CWS.	County/Medium	Minor adverse, **not significant**.
Breeding birds.	Local/Low	Minor adverse, **not significant**.
Farmland birds.	Local/Low	Minor adverse, **not significant**.
Great crested newts / amphibians.	County/Medium	Neutral, **not significant**.
Reptiles	County/Medium	Neutral, **not significant**.
Bats	County/Medium	Minor adverse, **not significant**.

c) Assessment of potential cumulative effects during operation

4.8.46 During the operation of the main development site, the following non-Sizewell C developments have been scoped into the assessment:

- Land to The South of Red House Lane, Leiston, Suffolk (planning application DC/17/1605/FUL).
- Land at the rear of St Margaret's Crescent, Leiston, Suffolk (planning application DC/16/2104/OUT).

- Johnsons Farm, Saxmundham Road, Leiston, Suffolk (planning application DC/16/1961/OUT).
- Land East of Abbey Road, Leiston, Suffolk (planning application DC/16/1322/OUT).
- Part Land South West Aldringham House, Aldeburgh Road, Aldringham Cum Thorpe, Suffolk (planning application DC/18/2325/FUL).
- Land Between Station Garage and Railway Cottage, Main Road, Darsham, Suffolk (planning application DC/14/0420/OUT).

4.8.47 **Table 4.10** below presents the overall summary of the cumulative effect anticipated for the identified IEFs during the operational phase of the Sizewell C schemes in conjunction with the non-Sizewell C scheme. This focuses on the worst-case assessment outcome across all of the non-Sizewell C developments.

4.8.48 A number of the IEFs are identified as anticipated to experience a neutral or negligible cumulative effect which is not considered to be significant. Sensitive receptors which could potentially experience cumulative effects generated during the operational phase of the main development site in combination with the short- listed non-Sizewell C schemes include the following:

- Designated sites international and national (including qualifying features) SPA, SAC, Ramsar Site, and SSSI.
- County wildlife sites (CWS) Sizewell levels and Associated Areas CWS.
- Breeding birds.
- Farmland birds.
- Great crested newts.
- Reptiles.
- Bats.
- Badgers.

4.8.49 These receptors may experience disturbance by increased lighting and noise.

4.8.50 During the operational phase of the main development site, all mitigation for the main development site, the permanent associated developments and the non-Sizewell C developments listed would all have been fully implemented and established, including the habitat establishment and landscape design of the main development site in accordance with the **oLEMP** (Doc Ref. 8.2). Those associated development sites identified for reinstatement would have been reinstated to their baseline condition.

4.8.51 The IEFs of reptiles, badgers and great crested newts have been identified as likely to experience a neutral effect which is **not significant**. Therefore, these IEFs have not been considered further within this assessment in relation to the operational phase of the main development site.

Designated sites

4.8.52 The Sizewell beachfront would be fully accessible. In addition, the alternative recreational spaces / Suitable Alternative Natural Greenspaces created to support the residential developments would provide recreational opportunities for local residents and visitors. Through an increase in accessible spaces and Suitable Alternative Natural Greenspaces, pressures on the international and nationally designated sites is likely to be reduced given the range of alternative sites available. An overall slight beneficial cumulative effect is anticipated in the long-term.

Farmland birds / breeding birds

4.8.53 There will be extensive areas of habitats lost to facilitate construction including the habitat establishment and landscape design of the main development site in accordance with the **oLEMP** (Doc Ref. 8.2), which would be of benefit to farmland birds and breeding birds more generally. The alternative recreational spaces / Suitable Alternative Natural Greenspaces created to support the residential developments as well as the landscapes for these developments would be established. Farmland birds are considered likely to experience a minor adverse cumulative effect given that there will be some permanent arable farmland habitat loss overall, whilst breeding birds more generally are likely to experience a slight beneficial cumulative effect given the extensive habitats being created.

Bats

4.8.54 Bats are also anticipated to receive long-term benefits for the same reasons provided above for breeding birds and given the extensive bat roost mitigation that will be incorporated within the Sizewell C Project, and a potentially slight beneficial cumulative effect is likely.

Table 4.10: Cumulative Effects Assessment for Sizewell and Non-Sizewell C Developments- Operational Stage

Important Ecological Feature	Sensitivity/Valuation	Residual Effect
Designated sites international and national (including qualifying features) SPA, SAC, Ramsar Site, and SSSI.	International and National/High.	Slight beneficial, **not significant**.
County wildlife sites (CWS) Sizewell Levels and Associated Areas CWS.	County/Medium	Negligible, **not significant**.
Breeding birds.	Local/Low	Neutral (potentially minor beneficial), **not significant**.
Farmland birds.	Local/Low	Minor adverse, **not significant**.
Great crested newts / amphibians.	County/Medium	Neutral, **not significant**.
Reptiles	County/Medium	Neutral, **not significant**.
Bats	County/Medium	Neutral (potentially minor beneficial), **not significant**.
Badgers	Local/Low	Negligible, **not significant**.

4.9 Amenity and Recreation

a) Methodology

i. Zone of Influence

4.9.1 The assessment of the amenity and recreation cumulative effects has been undertaken in accordance with the amenity and recreation assessment methodology provided in **Appendix 6K** in **Volume 1** of the **ES**. The amenity

and recreation cumulative assessment utilises a study area of 15km from the boundary of the Sizewell C project for major infrastructure projects (i.e. those going through the DCO process), 5km from the boundary of the Sizewell C project for major developments (i.e. those requiring EIA) and 1km from the boundary of the Sizewell C project for smaller scale development. Beyond this, any other development in combination with the proposed development would be unlikely to give rise to any significant effects on amenity and recreation receptors due to the distance reducing potential visual effects, potential changes to noise, air quality or traffic, or potential to lead to increased use of recreational resources.

4.9.2 Cumulative impacts may occur due to physical changes to recreational resources (such as PRoW diversions), and changes to noise, views, air quality, traffic and people (i.e. increases in people at recreational resources caused by a development effecting the amenity of existing receptors).

ii. Schemes for consideration

4.9.3 Cumulative amenity and recreation effects may arise in-combination with the following non-Sizewell C schemes:

- East Anglia ONE North Offshore Windfarm (ID 13). Application for development consent was submitted in October 2019, with current proposals showing the proposed windfarm approximately 51km offshore from Sizewell. Landfall is shown to be north of Thorpeness and an underground cable route running south of Leiston to a grid connection at Grove Wood, south east of Saxmundham. Construction activities could overlap and the windfarm would not be operational until 2045.

- East Anglia TWO Offshore Windfarm (ID 14). Application for development consent was submitted in October 2019, running in parallel with East Anglia ONE North and using the same onshore proposals. The proposed windfarm would be located approximately 35km offshore from Sizewell.

- Nautilus Interconnector (ID A111). A proposal to build a high voltage direct current transmission cable between East Suffolk and Belgium. The project is at an early stage, but the current preferred option is for landfall to be in the Leiston area. Installation may commence in 2026 with connection in 2028.

- Eurolink Interconnector (ID A112). A proposal to build a high voltage direct current transmission cable between the UK and the Netherlands. The project is at an early stage, but the current preferred option is for landfall to be in the Leiston area. Likely to connect in 2025.

- Greater Gabbard extension (ID A113). A proposal to expand the Greater Gabbard Offshore Wind Farm. The windfarm would be located 27km from the Suffolk coast. Cable landfall is planned at Sizewell, adjacent to the Greater Gabbard landfall site. The project is progressing towards the award of development rights.

- Galloper Extension Offshore Wind Farm (ID A114). Expansion of the Galloper Offshore Wind Farm. The windfarm would be located further from the coast than the existing windfarm and the proposed Greater Gabbard extension. It is anticipated that cable landfall would also be at Sizewell, adjacent to the Greater Gabbard landfall site. The project is progressing towards the award of development rights.

- The England Coast Path (ID A110). The England Coast Path is a proposed National Trail around all of England's coast. Natural England expects to complete work on the England Coast Path within the vicinity of Sizewell C in 2020, and it would therefore be in place prior to commencement of construction of Sizewell C. The route within the study area has yet to be confirmed but it is likely to follow the Suffolk Coast Path past Sizewell C. Effects on users of the Suffolk Coast Path and future England Coast Path are assessed in **Volume 2, Chapter 15** of the **ES**. Creation of the England Coast Path may involve works to improve the Suffolk Coast Path and result in a slight increase in its use relative to its existing level of use. This would have very little or no effects on the recreational amenity of users of the Suffolk Coast Path, or other recreational receptors, and the England Coast Path is not discussed further in this cumulative assessment.

4.9.4 In addition, where potential cumulative schemes are located within existing built-up areas, replace existing similar development or would be separated from the Sizewell C Project by intervening landform, built form or vegetation, resulting in no or very limited potential for cumulative effects, these have not been considered further as part of the assessment of cumulative effects. Amenity and recreation effects relating to the relocation of or

decommissioning of facilities at Sizewell B have been considered in the main development site assessment provided in **Volume 2**, **Chapter 13** of the **ES**.

4.9.5 The cumulative assessment considers impacts on amenity and recreation receptors for construction, removal and reinstatement of associated development sites, and operation of the main development site.

b) Assessment of potential cumulative effects during construction

i. Early years of construction of the main development site (2023)

4.9.6 During early years of construction of the main development site and the removal and reinstatement phase, cumulative effects relating to amenity and recreation may arise in-combination with the following non-Sizewell C schemes (should they occur at the same time):

- East Anglia ONE North Offshore Windfarm.
- East Anglia TWO Offshore Windfarm.
- Nautilus Interconnector.
- Eurolink Interconnector.
- Greater Gabbard extension.
- Galloper Extension Offshore Wind Farm.

4.9.7 Users within receptor groups and on linear recreational routes which could potentially experience cumulative effects generated during the early years of construction in combination with the short listed non-Sizewell C schemes include the following:

- Receptor Group 12: Minsmere to Sizewell Coast (high sensitivity).
- Receptor Group 15: Sizewell Belts (high sensitivity).
- Receptor Group 18: Knodishall and Aldringham (medium sensitivity).
- Receptor Group 19: Aldringham Common and The Walks (high-medium sensitivity).

- Receptor Group 20: Sizewell to Thorpeness Coast (high sensitivity).
- Suffolk Coast Path and future England Coast Path (high sensitivity).
- Sandlings Walk (high sensitivity).
- Regional Cycle Route 42 (high to medium sensitivity).

4.9.8 Effects on these receptors would occur as a result of the construction of the Sizewell C Project. The construction of the cable route and the substation elements of East Anglia ONE North and East Anglia TWO, Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension Offshore Wind Farm, should they occur at the same time as the early years construction of the main development site, are also likely to have effects on some receptors. However, the addition of localised short to medium-term construction effects from these other proposals would not result in an increase to the significance of the effects for all of these receptors. Cumulative effects for the following receptors would remain as described in **Volume 2, Chapter 15** of the **ES**, and range from minor adverse and not significant to major adverse and significant:

- Receptor Group 12: Minsmere to Sizewell Coast, major adverse **(significant)**;
- Receptor Group 15: Sizewell Belts, major adverse **(significant)**;
- Suffolk Coast Path and future England Coast Path, major adverse **(significant)**;
- Sandlings Walk, major adverse **(significant)**; and
- Regional Cycle Route 42, minor adverse **(not significant)**.

4.9.9 The following receptor groups are anticipated to experience cumulative effects during the early years of construction:

- Effects on users of Receptor Group 18: Knodishall and Aldringham from the Sizewell C Project would currently only occur as a result of the construction of the main development site. The construction of the cable route and the substation elements of East Anglia ONE North and

East Anglia TWO should they occur at the same time as the early years construction of the main development site, might also affect receptors within this receptor group. The effect of the construction of the main development site on this receptor group has been assessed to be minor adverse and **not significant**. The addition of the localised, up to medium scale, short to medium-term construction effects from the cumulative schemes would result in effects of medium-low magnitude, moderate-minor adverse and **not significant.** The cumulative effect on this receptor group arises primarily as a result of the combined construction effects of the East Anglia ONE North and East Anglia TWO cable route and substations. The substations and cable route for East Anglia ONE North and East Anglia TWO lie within this receptor group whereas the main development site lies outside it, and the cumulative schemes would have greater effects than the main development site. These effects would reduce following the completion of the East Anglia ONE North and East Anglia TWO cable route and substations.

- Effects on users of Receptor Group 19: Aldringham Common and The Walks from the Sizewell C Project would currently only occur as a result of the construction of the main development site. The construction of the landfall and cable route elements of East Anglia ONE North, East Anglia TWO, Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension Offshore Wind Farm, as well as potentially the substations for Greater Gabbard extension and Galloper Extension Offshore Wind Farm, should they occur at the same time as the early years construction of the main development site, may also affect receptors within this receptor group. The effect of the construction of the main development site on this receptor group has been assessed to be moderate adverse and considered to be significant. The addition of the localised, up to medium scale, short to medium-term construction effects from the cumulative schemes would result in effects of medium to low **magnitude, major-moderate adverse** and **significant.** As there is less certainty about the proposals for Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension Offshore Wind Farm, given their stage in the planning process, it is anticipated that the significant cumulative effect on this receptor group arises primarily as a result of the combined construction effects of the East Anglia ONE North and East Anglia TWO cable route and landfall, including the presence of construction compounds (referred to as construction consolidation

sites). The landfall and cable route for East Anglia ONE North and East Anglia TWO lie within this receptor group whereas the main development site lies outside it, and the cumulative schemes would have greater effects than the main development site. Effects would reduce following the completion of construction the East Anglia ONE North and East Anglia TWO cable route and landfall, to become **not significant** over time. No further mitigation for effects of the main development site are considered necessary.

- Effects on users of Receptor Group 20: Sizewell to Thorpeness Coast from the Sizewell C Project would currently only occur as a result of the construction of the main development site. The construction of the landfall and cable route elements of Greater Gabbard extension and Galloper Extension Offshore Wind Farm, as well as potentially elements of East Anglia ONE North, East Anglia TWO, Nautilus Interconnector, Eurolink Interconnector, should they occur at the same time as the early years construction of the main development site, might also affect receptors within this receptor group. The effect of the construction of the main development site on this receptor group has been assessed to be minor adverse and **not significant**. The addition of the localised, small scale, short to medium-term construction effects from the cumulative schemes would result in effects of very low magnitude, minor adverse and **not significant.**

ii. Peak years of construction of the main development site (2028)

4.9.10 During the peak of construction of the main development site (when all associated developments are operational and the main development site is under construction), cumulative amenity and recreation effects may arise in-combination with the following non-Sizewell C schemes (should they occur at the same time):

- East Anglia ONE North Offshore Windfarm. Potential for ongoing overlap of construction activities.
- East Anglia TWO Offshore Windfarm. Potential for ongoing overlap of construction activities.
- Nautilus Interconnector. Potential for ongoing overlap of construction activities.

- Eurolink Interconnector. Potential for ongoing overlap of construction activities.

- Greater Gabbard extension. Potential for ongoing overlap of construction activities.

- Galloper Extension Offshore Wind Farm. Potential for ongoing overlap of construction activities.

4.9.11 Receptors which could potentially experience cumulative amenity and recreation effects during the peak of construction of the main development site and operation of the associated development sites in combination with the short listed non-Sizewell C schemes would remain the same as for the early years of construction. These receptors are likely to experience cumulative impacts that are broadly the same as for the early years of construction.

c) Assessment of potential cumulative effects during operation

4.9.12 During the operation of the main development site, cumulative effects relating to amenity and recreation may arise in-combination with the following non-Sizewell C schemes (should they occur at the same time):

- East Anglia ONE North Offshore Windfarm. Potential for ongoing construction activities.

- East Anglia TWO Offshore Windfarm. Potential for ongoing construction activities.

4.9.13 Construction of the majority of the other non-Sizewell C schemes is assumed to be complete by the operational phase of the main development site and the landfall, cable and substation works are assumed to result in minimal amenity and recreation effects during the operational phase of the other non-Sizewell C schemes.

4.9.14 Sensitive receptors which could potentially experience cumulative amenity and recreation effects generated during operation in combination with the short listed non-Sizewell C schemes include the following:

- Receptor Group 12: Minsmere to Sizewell Coast (high sensitivity).

- Receptor Group 15: Sizewell Belts (high sensitivity).
- Suffolk Coast Path and future England Coast Path (high sensitivity).
- Sandlings Walk (high sensitivity).

4.9.15 Effects on these receptors would occur as a result of the construction of the Sizewell C Project. The construction of the cable route and the substation elements of East Anglia ONE North and East Anglia TWO, should they occur at the same time as the early years construction of the main development site, are also likely to have effects on some receptors. However, the addition of localised short to medium-term construction effects from these other proposals would not result in an increase to the significance of the effects. Cumulative effects for these receptors would remain as described in **Volume 2, Chapter 15** of the **ES** where no project-wide effects are anticipated, and would be:

- Receptor Group 12: Minsmere to Sizewell Coast, moderate adverse and **significant.**
- Receptor Group 15: Sizewell Belts, major beneficial and **significant.**
- Suffolk Coast Path and future England Coast Path, minor adverse and **not significant.**
- Sandlings Walk, minor adverse and **not significant**.

4.10 Terrestrial Historic Environment

a) Methodology

4.10.1 The schemes under consideration for cumulative effects have been identified using the Zone of Influence, which for the terrestrial historic environment included those schemes which had the potential to have indirect effects on heritage assets, or potential direct effects on archaeological remains or historic landscape character, in-combination with the Sizewell C Project. The following schemes were identified:

- East Anglia ONE North - offshore windfarm (ID 13);
- East Anglia TWO - offshore windfarm (ID 14);

- DC/16/1322/OUT: Land East of Abbey Road, Leiston, Suffolk;
- Land Between Station Garage and Railway Cottage, Main Road, Darsham, Suffolk (DC/14/0420/OUT) (ID 89);
- DC/16/2104/OUT: Land at The Rear of St Margaret's Crescent, Leiston, Suffolk;
- Johnsons Farm, Saxmundham Road, Leiston, Suffolk (DC/16/1961/OUT) (ID 29); and
- Levington Lane, Bucklesham, Suffolk (DC/19/4510/OUT) (ID 672).

b) Assessment of potential cumulative effects during construction

i. Early years

4.10.2 During early years of construction of the main development site and the removal and reinstatement phase, cumulative effects relating to the terrestrial historic environment may arise in-combination with the following non-Sizewell C schemes:

- East Anglia ONE North - offshore windfarm (ID 13);
- East Anglia TWO - offshore windfarm (ID 14);
- DC/16/1322/OUT: Land East of Abbey Road, Leiston, Suffolk;
- Land Between Station Garage and Railway Cottage, Main Road, Darsham, Suffolk (DC/14/0420/OUT) (ID 89);
- DC/16/2104/OUT: Land at The Rear of St Margaret's Crescent, Leiston, Suffolk;
- Johnsons Farm, Saxmundham Road, Leiston, Suffolk (DC/16/1961/OUT) (ID 29); and
- Levington Lane, Bucklesham, Suffolk (DC/19/4510/OUT) (ID 672).

4.10.3 These developments have been identified where they have the potential to contribute to cumulative change in the settings of heritage assets that would also be subject to change resulting from the proposed Sizewell C Project and/or are of sufficient scale and proximity to the proposed Sizewell C Project to give rise to discernible additional disturbance to archaeological remains or to contribute to cumulative change to historic landscape character.

4.10.4 Receptors which could potentially experience cumulative effects relating to the terrestrial historic environment generated during the early years of construction in combination with the short-listed non-Sizewell C schemes include the following:

- archaeological heritage assets;
- Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox; and
- historic landscape character.

4.10.5 These receptors may experience the following cumulative impacts:

- loss of archaeological remains of low and medium significance resulting in loss of archaeological interest;
- change to setting of Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox which is of high significance, resulting in loss of architectural and historic interest; and
- change to historic landscape character of low significance resulting in loss of historic interest.

Disturbance of archaeological remains

4.10.6 In general, it is unlikely that significant adverse cumulative effects would arise on archaeological heritage assets. This is because heritage assets are generally well defined and discrete features within the landscape that are too small to be affected by more than one scheme. However, the cumulative effects assessment has considered potential cumulative effects on archaeological heritage where an identified cumulative scheme is located very close to a Sizewell C Project site.

4.10.7 In addition, heritage assets which form elements of the medieval agricultural landscape around Leiston and Leiston Abbey and the early-medieval and medieval settlements at LEEIE and Lover's Lane could be affected by loss of related, but physically discrete heritage assets.

4.10.8 Developments at St Margaret's Crescent, Leiston (DC/16/2104/OUT) and Land East of Abbey Road, Leiston (DC/16/1322/OUT) have the potential to affect elements of the medieval agricultural landscape around Leiston and Leiston Abbey. These assets (which comprise buried archaeological remains) would also be affected by works at the main development site, particularly LEEIE, through disturbance of remains such as former boundary ditches or trackways and possible medieval domestic plots. These assets are of low heritage significance at most and any disturbance would be of a high magnitude in the absence of mitigation. Where mitigation in the form of an agreed written scheme of archaeological investigation (WSI) is in place, a low magnitude adverse cumulative impact would arise. Consequently, there would be a negligible cumulative effect which would be **not significant**.

4.10.9 Development at Johnsons Farm, Saxmundham Road, Leiston (DC/16/1961/OUT) has the potential to affect elements of the medieval agricultural landscape around Leiston and Leiston Abbey that would also be affected by works at the green rail route, through disturbance of remains such as former boundary ditches or trackways and possible medieval domestic plots. These assets are of low heritage significance at most and any disturbance would, in the absence of mitigation, result in a high magnitude impact, a moderate adverse effect which would be significant. Where mitigation in the form of an agreed WSI is in place, a low magnitude adverse cumulative impact would arise. Consequently, there would be a negligible **cumulative effect** which would be **not significant**.

4.10.10 Development at Levington Lane, Bucklesham (DC/19/4510/OUT) has the potential to affect archaeological remains associated with the wider prehistoric landscape including settlement and funerary activity that would also be affected by works at the freight management site. These assets are of medium heritage significance and any disturbance would, in the absence of mitigation result in a high magnitude impact, a moderate adverse effect which would be **significant**. Where mitigation in the form of an agreed WSI is in place, a low magnitude adverse cumulative impact would arise. Consequently, there would be a minor adverse cumulative effect which would be **not significant.**

Visual and audible change to setting of heritage assets

Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox

4.10.11 Construction of the East Anglia ONE North and East Anglia TWO offshore windfarms could give rise to adverse cumulative change in the setting of Leiston Abbey (first Site). The turbine arrays would appear as distant features in the background of views towards the sea from the asset. The proposed turbine arrays would be clearly separated from the asset through their location offshore. Turbines would not appear in simultaneous views with the construction works and while they would be discernible with varying degrees of clarity depending on weather conditions the contribution of the setting to the significance of the asset would not be changed. Consequently, **no cumulative effect** would arise.

Change to historic landscape character

4.10.12 Change to historic landscape character could occur where other development is close enough to the proposed Sizewell C development to affect the historic landscape elements that are also affected by Sizewell C. In addition, particularly large developments have the potential to give rise to cumulative erosion of the historic landscape character as a whole when taken in conjunction with the works on the main development site. In this case, the distance of the other developments considered, their scale and their location, means that there would not be any increased magnitude of impact to historic landscape character as a whole. As a result, **no cumulative effect** would arise.

ii. Peak years of construction

4.10.13 During the peak of construction of the main development site (when all associated developments are operational and the main development site is under construction), cumulative effects relating to the terrestrial historic environment may arise in-combination with the following non-Sizewell C schemes:

- East Anglia ONE North - Offshore Windfarm (ID 13); and
- East Anglia TWO - Offshore Windfarm (ID 14).

4.10.14 Developments have been identified where they have the potential to contribute to cumulative change in the settings of heritage assets that would

also be subject to change resulting from the proposed Sizewell C development.

4.10.15 Receptors which could potentially experience cumulative effects relating to the terrestrial historic environment generated during the peak of construction in combination with the short-listed non-Sizewell C schemes include the following:

- Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox, which are of high significance; and
- historic landscape character of low significance.

4.10.16 These receptors may experience the following cumulative impacts:

- change to setting of Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox resulting in loss of architectural and historic interest; and
- change to historic landscape character resulting in loss of historic interest.

Disturbance of archaeological remains within the site

4.10.17 In that disturbance of archaeological heritage assets would have occurred during the early stages of construction, there would be no adverse direct cumulative effects are anticipated.

Visual and audible change to setting of heritage assets

Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox

4.10.18 Visibility of the East Anglia ONE North, and East Anglia TWO offshore windfarms would persist with the turbine arrays appearing as distant features in the background of views towards the sea from the asset. The overall impact would increase from that experienced during early years of construction as a result of increased visibility of at-height works and other construction infrastructure at the Sizewell C main development site. This increased impact to heritage significance would, however, result entirely from the changed appearance of the Sizewell C works rather than any interaction between schemes and as a result, **no cumulative effect** would arise.

Change to historic landscape character.

4.10.19 Any loss of historic landscape character would occur during the early years of construction, and any effect would persist through the construction period, so no new effects on historic landscape character would arise during peak construction years.

iii. Assessment of potential cumulative effects during removal and reinstatement of associated development sites

4.10.20 No cumulative effects are anticipated to arise as a result of the removal and reinstatement of associated development sites.

c) Assessment of potential cumulative effects during operation of the main development site

4.10.21 During the operation of the main development site, cumulative effects relating to the terrestrial historic environment may arise in-combination with the following non-Sizewell C schemes:

- East Anglia ONE North - Offshore Windfarm (ID 13); and
- East Anglia TWO - Offshore Windfarm (ID 14).

4.10.22 Receptors which could potentially experience cumulative effects relating to the terrestrial historic environment generated during operation in combination with the short-listed non-Sizewell C schemes include the following:

- Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox, which is of high significance; and
- historic landscape character of low significance.

4.10.23 These receptors may experience the following cumulative impacts:

- change to setting of Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox resulting in loss of architectural and historic interest; and
- change to historic landscape character resulting in loss of historic interest.

Visual and audible change to setting of heritage assets

Scheduled Monument (SM 1015687) at Leiston Abbey (first site) with later chapel and pillbox

4.10.24 Visibility of the East Anglia ONE North and East Anglia TWO offshore windfarms would persist with the turbine arrays appearing as distant features in the background of views towards the sea from the asset. The overall magnitude of change would reduce markedly from that experienced during peak construction as a result of the removal of at-height works and other construction infrastructure and the maturing landscape restoration at the Sizewell C site. This reduced magnitude of impact from the peak years would, however, result entirely from reduced visual prominence of the Sizewell C works rather than any interaction between schemes and as a result, **no cumulative effect** would arise.

Change to historic landscape character.

4.10.25 There are no identified developments that would contribute to a cumulative effect on historic landscape character in the operational phase. In addition, the restoration of the main development site construction area would result in a reduction in the magnitude of any adverse change to historic landscape character and **no cumulative effect** would arise.

4.11 Soils and Agriculture

a) Methodology

4.11.1 The assessment of the soils and agriculture cumulative effects has been undertaken in accordance with the Soils and Agriculture methodology provided in **Volume 1**, **Appendix 6M** of the **ES**.

i. Zone of Influence

4.11.2 From the long list of potential cumulative schemes, those which lay within 20km of the main development site of the Sizewell C Project and within 5km of the off-site associated development sites and 1km from the rail upgrades, and which potentially impacted on agricultural land were selected for inclusion in the assessment.

4.11.3 Detailed information relevant to those schemes on the short list of plans, projects and programmes detailed in **Appendix 4B** of this volume was then reviewed to determine if there was the potential for cumulative effects.

4.11.4 The following receptors have been identified to have the potential to experience cumulative effects:

- the soil types and related agricultural land classification (ALC)[1] grades likely to be affected by the proposed development;
- the type of farm enterprises and farming or land management practices present, including any agri-environment schemes[2]; and
- the possible presence of crop, soil or animal diseases or noxious weeds, and the risk of spreading such disease or weeds.

b) Assessment of potential cumulative effects during construction

i. Assessment of potential cumulative effects during early years of construction

4.11.5 During early years of construction of the main development site (when all associated developments and the main development site would be undergoing construction) cumulative effects relating to soils and agriculture may arise in-combination with the following non-Sizewell C schemes:

- Land At The Rear Of St Margaret's Crescent, Leiston, Suffolk DC/16/2104/OUT (ID 28);
- Johnsons Farm, Saxmundham Road, Leiston, Suffolk DC/16/1961/OUT (ID 29);
- Land East Of Abbey Road, Leiston, Suffolk DC/16/1322/OUT (ID 30);

[1] Agricultural land in England and Wales is graded between 1 and 5, depending on the extent to which physical or chemical characteristics impose long-term limitations on agricultural use. Grade 1 land is excellent quality agricultural land with very minor or no limitations to agricultural use, and Grade 5 is very poor quality land, with severe limitations due to adverse soil characteristics, relief, climate or a combination of these. Grade 3 land is subdivided into Subgrade 3a (good quality land) and Subgrade 3b (moderate quality land). Grades 1, 2 and 3a are defined as best and most versatile (BMV) land.

[2] Agri-environment schemes are land management practices which protect and enhance the environment, for example planting field margins with food sources for insects and reduced management of hedgerows to provide more habitat for farmland birds.

- Proposed Radio Base Station, The Broom (track), Gedgrave, Suffolk DC/16/4785/FUL (ID 44);
- Part Land South West Aldringham House, Aldeburgh Road, Aldringham Cum Thorpe, Suffolk DC/18/2325/FUL (ID 47);
- Land Between Station Garage And Railway Cottage, Main Road, Darsham, Suffolk DC/14/0420/OUT (ID 89);
- Land Adjacent Bridge Cottage, The Causeway, Peasenhall IP17 2HU DC/16/3514/FUL (ID 124);
- Land Off Main Road, Kelsale Cum Carlton, Suffolk DC/18/2621/FUL (ID 136);
- Part Land East Of Northern End Beech Road, Saxmundham, Suffolk DC/18/0702/FUL (ID 143);
- Land At Mount Pleasant, Framlingham, Suffolk DC/15/2759/FUL (ID 174);
- Newnham Business Park Saxtead Road, Framlingham, Suffolk DC/16/4370/OUT (ID 189);
- Glemham Estate Reservoir Land North Of Hill Farm Road, Farnham IP17 1LU DC/18/0322/FUL (ID 195);
- Land South Of Solomans Rest The Street, Hacheston, Suffolk DC/16/3863/OUT (ID 209);
- Site SSP12 Rendlesham, Suffolk DC/17/4188/EIA (ID 279);
- Land West Of Copperwheat Avenue, Reydon, Suffolk DC/19/0398/EIA (ID 419);
- Land Adjacent Further Green Farm, Uggeshall, Suffolk DC/14/2110/EIA (ID 429);

- Land South Of Chediston Street, Halesworth, Suffolk IP19 8TU DC/17/3981/OUT (ID 443);
- Part Land South Of Fairview Farm, Norwich Road, Halesworth, Suffolk DC/17/1012/OUT (ID 444);
- Land North And East Of Hill Farm Road, Halesworth, Suffolk DC/16/5410/OUT (ID 445);
- Land Rear Of 34-48 Old Station Road, Halesworth, Suffolk DC/15/3221/OUT (ID 450);
- Land At Bickers Hill, Laxfield IP13 8EZ DC/18/02633 (ID 529);
- Land On West Side Of Bickers Hill Road, Laxfield 3642/16 (ID 530);
- Land Adjacent To Mill Road, Laxfield, Suffolk 3079/15 (ID 532); and
- Land To The West Of Copperwheat Avenue, Reydon IP18 6YD DC/19/1141/OUT (ID 545)
- Levington Lame, Bucklesham, Suffolk DC/19/4510/FUL (ID 672); and
- Felixstowe Road, Stratton Hall, Suffolk DC/19/4343/FUL (ID 675).

4.11.6 Effects may arise due to these schemes affecting agricultural land, some of which may be best and most versatile (BMV) land and affecting the agricultural businesses which use the land.

4.11.7 Sensitive receptors which could potentially experience cumulative effects relating to soils and agriculture generated during the early years of construction in combination with the short-listed non-Sizewell C schemes include the following:

- BMV land (i.e. Grade 1, 2 and 3a land) which is considered to be of **high** sensitivity;

- arable enterprises, which are considered to be receptors of low sensitivity (unless irrigated where they are considered to be of high sensitivity);
- agricultural enterprises with stock animals, which are considered to be receptors of high sensitivity; and
- land under agri-environment schemes, which is considered to be of medium/high sensitivity.

4.11.8 These receptors may experience the following cumulative impacts:

- permanent and temporary loss of BMV land;
- impacts to land holdings, such as reduction in productivity and fragmentation);
- spread of invasive weed species; and
- impacts associated with dust, pollution and noise.

4.11.9 Given the sensitivity of BMV land and the potential additional temporary and permanent loss it is considered that there would be a cumulative effect and that this would be a medium/high magnitude impact which would be a major adverse effect and **significant**. This would, however, not be different to the project-wide effects during construction as described within **Volume 10**, **Chapter 3** of the **ES**.

4.11.10 The project-wide impact on agricultural land holdings resulting from temporary land take is considered to be of medium magnitude, resulting in a minor (**not significant**) to major (**significant**) adverse effect, depending on the land use, as described within **Volume 10**, **Chapter 3** of the **ES**. As different land holdings are likely to be affected by different schemes it is considered that the significance would remain the same as set out above.

4.11.11 Permanent land take for the Sizewell C Project has been assessed as being an impact of low magnitude, resulting in a minor **(not significant)** to major **(significant)** adverse effect, depending on the nature of the land use. Again, as different land holdings are likely to be affected by different schemes it is considered that the significance would remain the same with the cumulative schemes.

ii. Assessment of potential cumulative effects during peak of construction of the main development site

4.11.12 During the peak of construction of the Sizewell C Project (when all associated developments are operational and the main development site is under construction), cumulative effects in addition to those detailed above in **section 4.11.7** are not considered likely to be experienced. All the land required for construction would be taken in the early years and so there would be no additional impacts on agricultural land or farm businesses.

4.11.13 During the operation of the associated development sites and identified cumulative schemes, there is the potential for the spread of invasive weed species. However, with the mitigation in place (which is industry standard and so should be applicable to all schemes) this is likely to be no more than of very low magnitude and a negligible/minor adverse effect (depending on the sensitivity of the enterprise as detailed above) which would be **not significant**.

iii. Assessment of potential cumulative effects during removal and reinstatement of associated development sites

4.11.14 During the later years of construction of the main development site (during the removal and reinstatement phase of some of the associated development sites and the main development site is under construction), cumulative effects in addition to those detailed above are not considered likely to be experienced. All the land required for construction would be taken in the early years and so there would be no additional impacts on agricultural land or farm businesses.

c) Assessment of potential cumulative effects during operation of Sizewell C

4.11.15 During the operation of Sizewell C no additional cumulative effects relating to soils and agriculture would arise. No additional land would be required and there would be no additional effects on agricultural businesses. The effects would remain negligible as described in the project-wide assessment provided in **Chapter 3** of this volume.

4.12 Geology and Land Quality

a) Methodology

i. Zone of Influence

4.12.1 The Zone of Influence (ZOI) used to identify non-Sizewell C schemes and potential receptors and impacts for consideration in the geology and land quality assessment was 500 metres (m) around the proposed development.

4.12.2 The ZOI was used to identify an initial list of schemes that may have the potential to cause geology and land quality cumulative impacts. A screening exercise was then undertaken to identify which schemes needed to be considered further as part of the assessment.

4.12.3 Potential receptors and impact vary depending on the stage of the development and have therefore been defined in the individual sections below.

4.12.4 Several schemes were scoped out of the geology and land quality assessment due to their nature and scale. These schemes included house extensions and variations to existing planning permissions. Other smaller scale residential non-Sizewell C schemes were also scoped out of the cumulative assessment for geology and land quality. It has been assumed that these schemes will have been constructed prior to 2022 and they have therefore been considered as future receptors and, where relevant potential sources, as part of the baseline for the land contamination risk assessments and within the baseline assessment of physical effects and effects associated with mineral resources, soils re-use and waste soils. Further details are provided in **Volume 2, Chapter 18** and **Volumes 3** to **9, Chapter 11** of the **ES**.

ii. Schemes with the potential for cumulative geology and land quality effects

4.12.5 Based on the screening exercise outlined above, the following non-Sizewell C schemes have been considered in the cumulative assessment for geology and land quality for both the construction and operational phases of the proposed development:

- land east of Abbey Road, Leiston (Ref. DC/16/1322/OUT, ID 30, approved June 2017) – located 430m from the main development site. This will comprise the construction of 100 new residential units with

employment floorspace and family orientated public house / restaurant. Construction of the scheme has not commenced;

- land between Station Garage and Railway Cottage, Main Road, Darsham (Ref. DC/14/0420/OUT, ID 89, approved May 2014) – located 30m from the northern park and ride. This will comprise the erection of an 82 bedroom hotel, car parking and associated work. Construction of the scheme has not commenced;

- Glemham Estate Reservoir, Hill Farm Road, Farnham (Ref. DC/18/0322/FUL, ID 195, approved June 2018) – located 150m from the two village bypass. This will comprise the construction of an 80,000m^3 reservoir covering 3.5 hectares. Construction of the scheme has not commenced;

- Johnsons Farm Saxmundham Road, Leiston (Ref. DC/16/1961/OUT, ID 29, approved June 2017) – located 170m from the green rail route. This will comprise the construction of 187 dwellings to include car parking, open space provision with associated infrastructure and access. Construction of the scheme has not commenced; and

- land at the rear of St Margaret's Crescent, Leiston (Ref. DC/16/2104/OUT, ID 28, approved June 2017) – located 250m from the green rail route. This will comprise the erection of up to 77 new homes with associated access, infrastructure, landscaping and amenity space. Construction of the scheme has not commenced.

iii. General methodology

4.12.6 Receptors which could potentially experience cumulative effects relating to geology and land quality in combination with the construction of the non-Sizewell C schemes listed above include the following:

- geological receptors including underlying soils and bedrock (medium value/sensitivity);

- human health receptors including current on-site and off-site users (high sensitivity);

- controlled water receptors (groundwater) including Principal Aquifers and groundwater Source Protection Zones (high sensitivity);
- controlled water receptors (surface water) including rivers and ponds (medium sensitivity);
- property (crops and livestock) receptors (medium sensitivity);
- property (services and structures) receptors including listed buildings (medium sensitivity); and
- ecological receptors including Ancient Woodland (high sensitivity).

b) Assessment of potential cumulative effects during construction

i. Early years (2023)

4.12.7 During the early years of construction of the main development site and the removal and reinstatement phase, cumulative effects relating to geology and land quality may arise in-combination with the non-Sizewell C schemes listed in **section 4.12.5**.

4.12.8 The construction of these non-Sizewell C schemes could potentially be concurrent with the early years of the construction of the main development site and associated developments, and, due to their proximity to the site, may cause construction cumulative impacts.

4.12.9 The geology and land quality receptors identified in in **section 4.12.6** may experience the following cumulative impacts during the early years of the construction in combination with construction of non-Sizewell C schemes:

- an increase in soil erosion and the amount of dust and surface water run-off generated through a larger construction area affecting geological receptors, controlled waters (groundwater and surface water), human health, property (crops and livestock) and ecological receptors;
- sterilisation of larger areas of land from future mineral extraction either above or below ground;

- destabilisation of ground, where the developments are located in close proximity, causing ground stability issues to geological and property (services and structures) receptors; and

- an increase in the mobilisation of contaminants in the air, ground and groundwater through the disturbance of a larger area of potentially contaminated ground mobilising contaminants causing the exposure of human health, controlled waters (groundwater and surface water), property (crops and livestock) and ecological receptors to potential contaminants.

4.12.10 Primary, tertiary and secondary mitigation measures will be implemented as part of the construction of the main development site and associated developments as outlined in **Volume 2, Chapter 18, sections 18.5** and **18.7** and **Volumes 3** to **9, Chapter 11, sections 11.5** and **11.6,** of the **ES**. The non-Sizewell C schemes themselves will also be subject to the NPPF and, where relevant, NPSs and will require mitigation and control measures to be adopted during the construction through management plans to reduce impacts to the environment including dust generation and potential mobilisation of contaminants. The detailed design for the main development site and associated developments will also take into consideration any impacts associated with destabilising the ground due to construction activities close to the site.

4.12.11 Therefore, it is not expected that the combined impact of these cumulative effects would be greater than those effects predicted for geology and soils as outlined in **Volume 2, Chapter 18, section 18.8** and **Volumes 3** to **9, Chapter 11, section 11.8,** of the **ES**. Only negligible to minor adverse cumulative effects are anticipated, which are classified as **not significant**. No additional mitigation is anticipated.

4.12.12 During the removal and reinstatement phase of some of the associated development sites and the ongoing construction of the main development site), no cumulative effects relating to geology and land quality are anticipated in-combination with the operation of the non-Sizewell C schemes listed above. As outlined in **Volume 2, Chapter 18, section 18.8** and **Volumes 3** to **9, Chapter 11, section 11,** of the **ES,** only negligible to minor adverse cumulative effects are anticipated, which are classified as **not significant**. No additional mitigation is anticipated.

ii. Peak years

4.12.13 During the peak construction period of the main development site (when all associated developments are operational and the Main Development Site is under construction), cumulative effects relating to geology and land quality may arise in combination with the non-Sizewell C schemes listed above. The non-Sizewell C schemes will have been constructed by the time the associated developments are operational and will therefore be operational themselves.

4.12.14 Some of the geology and land quality receptors identified in **section 4.12.6** may experience the following cumulative impacts during the peak of construction of the Main Development Site and operation of the associated developments:

- an increase in the amount of dust generated through increased traffic movements affecting human health receptors; and
- the potential introduction of new sources of contamination from the new operational areas causing the exposure of human health, controlled waters (groundwater and surface water), property and ecological receptors to potential contaminants.

4.12.15 However, the associated developments and non-Sizewell C schemes will be operated in accordance with granted consents and the relevant regulations and best practice guidance in applying Best Available Techniques (BAT) and pollution prevention. Therefore, it is not expected that the combined impact of these cumulative effects would be greater than those effects predicted for geology and soils as outlined in **Volume 2, Chapter 18, section 18.8** and **Volumes 3** to **9, Chapter 11, section 11.8,** of the **ES**. Only negligible to minor adverse cumulative effects are anticipated, which are classified as **not significant**. No additional mitigation is anticipated.

c) Assessment of potential cumulative effects during operation

4.12.16 During the operation of the main development site, cumulative effects relating to geology and land quality may arise in combination with the operation of the non-Sizewell C schemes listed above.

4.12.17 The geology and land quality receptors identified in **section 4.12.6** may experience the following cumulative impacts during operation:

- an increase in the amount of dust generated due to maintenance works of Sizewell C and operation of the non-Sizewell C schemes affecting human health receptors; and

- the potential introduction of new sources of contamination from the new operational areas causing the exposure of human health, controlled waters (groundwater and surface water), property and ecological receptors to potential contaminants.

4.12.18 However, Sizewell C and non-Sizewell C schemes will be operated in accordance with granted consents and the relevant regulations, permits and best practice guidance in applying BAT and pollution prevention. Therefore, it is not expected that the combined impact of these cumulative effects would be greater than those effects predicted for geology and soils during operation of Sizewell C as outlined in **Volume 2, Chapter 18, section 18.8** and **Volumes 3** to **9, Chapter 11, section 11.8,** of the **ES**. Only negligible to minor adverse cumulative effects are anticipated, which are classified as **not significant**. No additional mitigation is anticipated.

4.13 Groundwater and Surface Water

a) Methodology

i. Zone of Influence

4.13.1 The ZOI for the groundwater and surface water cumulative effects assessment was considered to be 20 kilometres (km) around the main development site and 5km around the associated development sites, with the exception of the level crossing upgrades on the Saxmundham to Leiston branch line where the ZOI was considered to be 1km.

ii. General Methodology

4.13.2 The assessment of the groundwater and surface water cumulative effects has been undertaken in accordance with the groundwater and surface water assessment methodology provided in **Volume 1**, **Appendix 6O** of the **ES.** A matrix of receptor sensitivity/value and the magnitude of the impacts was used to determine the significance of an impact on a receptor. Major and moderate effects are considered to be significant and minor and negligible effects are considered to be **not significant**. Any embedded mitigation and the adherence to the NPPF and, where relevant, NPSs, were included in the cumulative assessment to reduce the magnitude of the impacts.

4.13.3 The short listed non-Sizewell C schemes were assessed in-combination with outcomes of the assessment of the Sizewell C developments to determine the effects on groundwater and surface water receptors. The groundwater and surface water assessment of the Sizewell C developments are provided in **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12,** of the **ES**.

4.13.4 Receptors which could potentially experience cumulative effects relating to groundwater and surface water generated during all phases of the Sizewell C Project, discussed in **section 4.1** of this chapter, in combination with the short listed non-Sizewell C schemes include the following:

- groundwater receptors including principal and secondary aquifers and groundwater source protection zones (very low to medium sensitivity);
- surface water receptors including rivers, drainage networks, floodplains and ponds (very low to medium sensitivity);
- groundwater and surface water abstractions (medium sensitivity);
- water dependent historic and ecological sites (low to high sensitivity); and
- existing buildings (medium sensitivity).

4.13.5 These receptors may experience the following cumulative impacts all phases of the Sizewell C development, discussed in **section 4.1** of this chapter:

- Alteration of groundwater level and flow regimes – through reduction in the rate or volume of water discharging to ground or due to the requirement for groundwater control dewatering measures. This may in turn reduce the availability of water at groundwater abstractions or groundwater dependent terrestrial ecosystems.
- Alteration of surface water flow regime - through increases in the extent of bare and compacted ground for a prolonged period or hardened/impermeable surfaces. These land use changes have the potential to increase surface run-off and increase in flood peaks in the nearest receptors.

- Contamination of groundwater and surface water - though the lateral movement or disturbance of existing contaminants and/or the introduction of new sources/contaminants during the construction and operational phases of these committed developments.

- Flood risk - through a loss in functional floodplain storage or the displacement of sea or river flood water.

- Water Framework Directive (WFD) compliance - though an impact that has to potential to alter the overall status of a designated water body.

b) Assessment of potential cumulative effects during construction

i. Early years (2023)

4.13.6 During early years of construction of the main development site (when all associated developments and the main development site are undergoing construction) cumulative effects relating to groundwater and surface water may arise in-combination with the following non-Sizewell C schemes:

- land east of Abbey Road, Leiston (Ref. DC/16/1322/OUT, ID 30, approved June 2017) – located 430m from the main development site. This will comprise the construction of 100 new residential units with employment floorspace and family orientated public house/restaurant. Construction of the scheme has not commenced;

- land between Station Garage and Railway Cottage, Main Road, Darsham (Ref. DC/14/0420/OUT, ID 89, approved May 2014) – located 30m from the northern park and ride. This will comprise the erection of an 82-bedroom hotel, car parking and associated work. Construction of the scheme has not commenced;

- Glemham Estate Reservoir, Hill Farm Road, Farnham (Ref. DC/18/0322/FUL, ID 195, approved June 2018) – located 150m from the two village bypass. This will comprise the construction of an 80,000m^3 reservoir covering 3.5 hectares. The reservoir will be used to store and supply water to the in-hand farming business for the irrigation of crops during the summer months. Construction of the scheme has not commenced;

- Johnsons Farm Saxmundham Road, Leiston (Ref. DC/16/1961/OUT, ID 29, approved June 2017) – located 170m from the green rail route. This will comprise the construction of 187 dwellings to include car parking, open space provision with associated infrastructure and access. Construction of the scheme has not commenced; and

- land at the rear of St Margaret's Crescent, Leiston (Ref. DC/16/2104/OUT, ID 28, approved June 2017) – located 250m from the green rail route. This will comprise the erection of up to 77 new homes with associated access, infrastructure, landscaping and amenity space. Construction of the scheme has not commenced.

4.13.7 The construction of these non-Sizewell C schemes is likely to be concurrent with the early years of construction of the main development site and associated developments, and due to their proximity to the site, may cause construction cumulative impacts.

4.13.8 Other smaller scale residential non-Sizewell C schemes have been scoped out of the cumulative assessment for groundwater and surface water. It has been assumed that these schemes will have been constructed prior to 2022 and they have therefore been considered as part of the future baseline. Further details are provided in **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12** of the **ES**.

4.13.9 Receptors and the associated cumulative impacts relating to the groundwater and surface water early years assessment are listed in **section 4.13a** of this chapter.

4.13.10 Mitigation measures as outlined in the environmental design and mitigation sections of **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12** of the **ES** will be implemented as part of the construction of the proposed Sizewell C developments. The non-Sizewell C schemes themselves will also be subject to the NPPF and, where relevant, NPSs and will require mitigation and control measures to be adopted during the construction through management plans to reduce impacts to the environment including:

- all site activities are carried out in accordance with the Environmental Permitting Regulations (England and Wales) 2016 (Ref. 4.12) and Water Resources Act 1991 (Ref. 4.13);

- implementation of working methods during construction to ensure there would be no surface water run-off from the works;
- implementation of appropriate pollution incident control; and
- implementation of appropriate and safe storage of fuel, oils and equipment during construction.

4.13.11 It is expected that the combined impact of these cumulative effects would not be greater than those effects predicted for groundwater and surface water assessment of the Sizewell C schemes. The inter-relationship effects would remain as negligible to minor adverse, which are classified as **not significant**, as described in **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12** of the **ES**.

4.13.12 It is anticipated that the construction of these non-Sizewell C schemes would not lead to a loss in functional floodplain storage or the displacement of sea or river flood water. A flood risk assessment for these developments may be required to ascertain whether these developments would alter local flood risk. The conclusions of the **Flood Risk Assessments** (Doc Ref. 5.2 to Doc Ref. 5.9) relating to the Sizewell C schemes confirms no change in flood risk is anticipated. Any effect on flood risk would be associated with a non-Sizewell C scheme.

4.13.13 It is anticipated that the construction of these non-Sizewell C schemes would not lead to a change in the WFD status of the listed designated groundwater and surface water bodies. A WFD compliance assessment for these developments may be required to ascertain whether these developments would be compliant or non-complaint with the WFD. The **WFD Compliance Assessment** (Doc Ref. 8.14) relating to the Sizewell C schemes outlines that all schemes are compliant and that no change in WFD status of the relevant receptors is anticipated. Any effect on WFD status would be associated with a non-Sizewell C scheme.

4.13.14 During the removal and reinstatement phase no cumulative effects relating to groundwater and surface water are anticipated in-combination with the operation of the non-Sizewell C schemes listed above. As outlined in **Volume 2, Chapter 19, section 19.8** and **Volumes 3** to **9, Chapter 12, Section 12.8**, of the **ES,** only **negligible** to minor adverse effects are anticipated, which are classified as **not significant**.

ii. Peak years

4.13.15 During the peak of the construction of the main development site (when all associated developments are operational and the main development site is under construction), cumulative effects relating to groundwater and surface water may arise in-combination with the non-Sizewell C schemes listed above. The non-Sizewell C schemes will have been constructed by the time the associated developments are operational and will therefore be operational themselves.

4.13.16 Receptors and the associated cumulative impacts relating to the groundwater and surface water peak years assessment are listed in **section 4.13a)** of this chapter. The Sizewell C proposed development and the non-Sizewell C schemes will be operated in accordance with granted consents and the relevant regulations and best practice guidance in applying Best Available Techniques (BAT) and pollution prevention. Therefore, it is not expected that the combined impact of these cumulative effects would be greater than those effects predicted for groundwater and surface water of the Sizewell C schemes. The inter-relationship effects would remain negligible to minor adverse, which are classified as **not significant** as described in **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12** of the **ES**.

4.13.17 During this phase of the proposed development, the non-Sizewell C schemes will also become receptors to the main development site construction works and operation of the associated developments. They have therefore been considered as future receptors as part of the baseline for the groundwater and surface water assessments. Further details are provided in **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12** of the **ES**.

c) Assessment of potential cumulative effects during operation

4.13.18 During the operation of Sizewell C, cumulative effects relating to groundwater and surface water may arise in-combination with the following non-Sizewell C schemes listed above and the decommissioning of Sizewell B power station. Operation is anticipated to commence in 2035.

4.13.19 Receptors and the associated cumulative impacts relating to the groundwater and surface water operational phase assessment are listed in **section 4.13a)** of this chapter.

4.13.20 Sizewell C and non-Sizewell C schemes will be operated in accordance with granted consents and the relevant regulations, permits and best practice guidance in applying BAT and pollution prevention. Therefore, it is not expected that the combined impact of these cumulative effects would be

greater than those effects predicted for groundwater and surface water. The inter-relationship effects would remain negligible to minor adverse, which are classified as **not significant**, as described in **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12** of the **ES**.

4.13.21 During the operational phase of Sizewell C, the non-Sizewell C schemes will also be receptors to the main development site. They have therefore been considered as future receptors as part of the baseline for the groundwater and surface water assessments. Further details are provided in **Volume 2, Chapter 19** and **Volumes 3** to **9, Chapter 12** of the **ES**.

4.14 Coastal Geomorphology and Hydrodynamics

a) Methodology

i. Zone of Influence

4.14.1 The Marine Management Organisation (MMO) public register and ArcGIS Online Marine Information System tool, and the Planning Inspectorate (PINS) National Infrastructure Planning registry, were used to identify third party plans, programmes, and projects for potential cumulative impacts. The plans and projects within the ZOI that have potential cumulative effects are provided in **Section 5.2.2** of **Appendix 20A** and are summarised in **Table 4.11**.

4.14.2 The only available spatial and temporal information on the third-party projects are the timeline and the projects' geographical boundaries (red line boundary) as extracted from MMOs public registry. A full assessment has not been carried out as the details of the activities within the 3rd party projects are not available. However, professional judgement has been used to make a relevant assessment from potential effects.

4.14.3 The Greater Sizewell Bay (GSB) is the Zone of Influence (ZOI) for coastal geomorphology receptors (as also set for the inter-relationship assessment in **Volume 2, Chapter 20**).

ii. General methodology

4.14.4 It has been assumed that the Eurolink and Nautilus Interconnectors have the same red line boundary within the GSB as the East Anglia ONE North and East Anglia TWO wind farms, as Leiston is stated as their planned landfall location within the GSB.

4.14.5 The Cumulative Effects Assessment (CEA) is carried out using the construction and operation timelines of the third party projects as defined at the assessment cut-off date (30th of December 2019).

4.14.6 The Shoreline Management Plan (SMP) (Ref. 4.14) epochs (short, medium and long-term) and the Royal Society for the Protection of Birds (RSPB) Minsmere Strategy are considered as they each overlap temporally with the construction and operational phase of the proposed development.

4.14.7 Within each temporal combination, all impacts are conservatively assumed to be continuously occurring.

4.14.8 The timeline of the proposed development and other developments used is considered accurate and is applied to determine the potential for temporal overlap of development activities. Whilst development timelines are subject to variation, the assessed effects from the Sizewell C Project acting cumulatively with other developments are not anticipated to change significantly if timelines shift by the order of years. To envelope worst case based depending on programme shifts, the main offshore works have been included in both the early year's assessment and main construction period.

Table 4.11: Inter-relationship and cumulative impact combinations

Construction Phase	Inter-relationship Impacts	Cumulative Impacts
Start of early years construction (2022).	• Activities associated with construction of the beach landing facility (BLF) including capital dredge, physical presence of piles and scour. • Operation of BLF including maintenance dredging. • Installation of Combined Drainage Outfall (CDO) headwork including capital dredge. • Operation of CDO. • Installation and use of the Soft Coastal Defence Feature (SCDF). • Installation of the cooling water intake and outfall heads including capital dredge.	• Construction of cable corridors for the Eurolink interconnector. • Construction of Scottish Power East Anglia ONE North and TWO. • Construction of the Nautilus interconnector.

Construction Phase	Inter-relationship Impacts	Cumulative Impacts
	• Drilling the intake and outfall shafts. • Installation of the Fish Recovery and Return (FRR) outfalls including capital dredge.	
Start of peak construction (2028).	• All activity associated with using the BLF including maintenance dredging, • Use of SCDF. • Use for CDO.	• Operation of Nautilus interconnector. • Operation of Eurolink interconnector. • Operation of the Scottish Power East Anglia ONE North and Two.

b) Assessment of potential cumulative effects during construction

4.14.9 During construction cumulative effects relating to coastal geomorphology and hydrodynamics may arise if an overlap occurs with the following non-Sizewell C Project schemes:

- Construction of National Grid Interconnector Eurolink (ID A112).
- Construction of National Grid Interconnector Nautilus (ID A111).
- Construction of Scottish Power East Anglia ONE North (ID 13) and East Anglia TWO (ID 14).

4.14.10 Geomorphic receptors that could experience cumulative effects in combination with non-Sizewell C Project schemes, during construction, include:

- the shingle beach/barrier;
- two sandy, shore-parallel longshore bars;
- the Sizewell–Dunwich Bank; and
- the Coralline Crag ridges that outcrop sub-tidally, extending to the north-east from Thorpeness.

4.14.11 As mentioned in the approach and methodology of the CEA, there are no specific details on the spatial and temporal footprints of the components or activities of the third party projects. However, the available third party project boundaries and timelines allow identification of potential overlap between components of the Sizewell C Project (spatially and temporally) with the third party projects. These overlaps are as follows:

- Nearshore dredging plumes for the BLF approach and plumes from the construction of the Eurolink interconnector: capital and maintenance dredging plumes may overlap with plumes from interconnector construction. This combination of activities could possibly lead to a short-term and localised impact but the inter-relationship effects would remain the same as for Sizewell C Project alone, i.e. minor adverse and **not significant.**

- The impact of a docked barge at the BLF and the construction of the Eurolink interconnector: a small area of impact on the seabed may arise if the landfall of the cable occurs close to Sizewell C Project, which is within the cable development corridor. This combination of activities could possibly lead to a short-term and localised cumulative impact but the inter-relationship effects would remain the same as for Sizewell C Project alone, i.e. negligible and **not significant**.

- Intake and outfall drilling and dredging plumes could overlap with plumes from the construction of the Eurolink interconnector, and Scottish Power East Anglia ONE North and East Anglia TWO: suspended sediment concentration (SSC) plumes from each development may overlap. This combination of activities could possibly lead to a short-term and localised cumulative impacts but the inter-relationship effects would remain the same as for Sizewell C alone, i.e. negligible and **not significant**.

- Release of SDCF sediments to the active beach during storms could coincide with the construction of the cable corridors for the Eurolink interconnector, and Scottish Power East Anglia ONE North and East Anglia TWO: a small area of impact may arise, depending on the eventual location of landfall within the cable corridors of the third party developments. However, SCDF release volumes are expected to be low and unlikely to raise average beach levels by more than a few centimetres per large storm, so a detectable impact is unlikely. inter-

relationship effects would remain the same as for Sizewell C Project alone, i.e. negligible (minor beneficial) and **not significant**.

c) Assessment of potential cumulative effects during operation Sizewell C

4.14.12 During the operation of Sizewell C Project, there are no expected cumulative effects on coastal geomorphology and hydrodynamics as the third party schemes will be operational.

4.15 Marine Ecology and Water Quality

a) Methodology

i. Zone of Influence

4.15.1 The Zone of Influence (ZOI) for water quality and marine ecology receptor groups considers the most appropriate scale for the assessment. **Table 4.12** summarises the ZOIs used and therefore the extent of search for the project screening exercise. The scope of the Marine Ecology CEA has been informed following consultation with statutory stakeholders; comments on the draft of the Environmental Statement, described in **Chapter 22** of **Volume 2** of the **ES**; marine technical forum meetings; and following similar consultation processes at Hinkley Point. **Section 4.15.g** of this chapter provides an executive summary of the marine ecology and water quality cumulative effects assessment, with the full assessment found in **Appendix 4C** of **Volume 10** of the **ES**.

Table 4.12: ZOI summary table.

Receptor	Description of Zone of Influence.
Water quality.	Within 10km radius of the proposed development as most impacts from the Sizewell C Project alone are spatially restricted, although recognising that increases in SSC above background could extend further than 10km.
Benthic ecology.	Benthic receptors found within the GSB are ubiquitous of the Southern North Sea communities and impacts are spatially restricted. As such the GSB is considered to be the most appropriate ZOI.
Fish	The CEA adopts the same assessment area as those used to contextualise impacts from the proposed development. The most wide-ranging impact associated with the proposed development relate to water abstraction causing mortality of fish receptors through impingement and entrainment. The combined effects of impingement and entrainment, termed entrapment, act as a form of non-selective fishing pressure that can act on all life-history stages of fish (from eggs to adult individuals). Fish entrapment assessments are contextualised

Receptor	Description of Zone of Influence.
	against ICES (International Council for the Exploration of the Seas) derived spawning stock biomass, which represents the international best practice approach for determining effects on a stock for either a fleet or individual vessel. Accordingly, the CEA follows the same approach. ICES stock assessment areas represent large spatial areas and cumulative effects from other relevant projects within the UK exclusive economic zone are considered at the same spatial scale. In the case of seabass, for example, the ICES stock unit means the proposed development and Hinkley Point C would effect fish from the same stock unit. Accordingly, the cumulative effects of Sizewell C and Hinkley Point C are assessed together in a CEA context.
Marine mammals.	Marine mammals are highly mobile species with large foraging ranges, as discussed in **Chapter 22** of **Volume 2** of the **ES**. To contextualise effects on highly mobile marine mammals the population management units were applied. The North Sea Management Unit is considered the appropriate area for assessment of effects on harbour porpoise populations. The Southern North Sea Special Area of Conservation (SAC), designated for harbour porpoise, is adjacent to the proposed development. One of the conservation objectives of the SAC is to prevent significant noise disturbance to harbour porpoise. Cumulative impacts of the proposed development in conjunction with other projects are considered at the spatial scale of the SAC. Potential effects on harbour porpoise in relation to the conservation objectives of the site are provided in further detail in the **Shadow HRA** (Doc Ref. 5.10). In the case of seals, the UK south-east England Management Unit is considered for harbour seals, whilst the south-east England Management Unit, north-east England Management Unit and east coast of Scotland Management Unit regions are considered for grey seals.
Commercial fisheries.	The CEA considers the potential for direct effects on commercial fisheries within the GSB arising from impacts of the proposed development and other developments. Indirect effects on the fishery due to effects on fish and shellfish (e.g. impingement) are considered.

4.15.2 In accordance with the guidance issued by the Planning Inspectorate (2019) (Ref. 4.15), the first stage of the CEA identified a long list of 'other developments' with the potential to result in cumulative effects in the marine environment.

4.15.3 Projects have been assigned to a 'tier' based on advice for defining types of plans and projects included in the CEA (Ref. 4.16). This five-tier approach has been used and accepted by regulators for offshore wind farm projects

and is applied here for marine water quality, marine ecology and fisheries assessments.

4.15.4 The total number of projects considered in the CEA screening is presented in **Table 4.13.** The types of projects considered are discussed further in **Appendix 4C** of this volume.

ii. Schemes with the potential for cumulative marine ecology and water quality effects

Table 4.13: Total number of projects considered in the Cumulative Effects Assessment

5 Tier approach	Advice note 17 tiers	Description	Number of projects
Tier 1.	(Baseline / Future Baseline).	Operational projects - no potential for temporal or geographic overlap with the construction or operational phase of the proposed development.	255
Tier 2.	Tier 1.	Marine infrastructure projects currently under construction and will be operational prior to the construction of proposed development.	17
Tier 3.	Tier 1.	Marine infrastructure projects that have been consented but for which construction has not yet started.	28
Tier 4.	Tier 1, Tier 2.	Marine infrastructure projects which have been submitted to the relevant regulatory body but not yet determined, or projects consented but on hold due to legal challenge or appeal.	14
Tier 5.	Tier 3.	Marine infrastructure projects which the regulatory body are expecting to be submitted for determination. These projects are excluded from the CEA due to the amount of uncertainty and lack of information to allow for a robust assessment.	3

4.15.5 Tier 5 projects are included in the initial long list as potential future concerns. However, due to the paucity of information and the high degree of uncertainty regarding these projects, qualitative assessments are made in the CEA.

iii. General methodology

4.15.6 The CEA has been based on the potential for pressures from other projects to overlap temporally and/or spatially according to the timeline detailed in **section A.1** of **Appendix 4C** of this volume. Cumulative effects assessments are inherently tied to the timelines of the proposed development and other (third party) developments. The CEA is therefore based on the following indicative timelines:

- Peak construction for the development is anticipated to occur in 2028. For the purposes of the marine assessments, the early construction phase for the development is defined as the six year period leading up to the peak construction year in 2028.
- Construction of the beach landing facility (under water noise assessments) is anticipated during the early construction phase, as described in **Appendix 4C** of this volume.
- The station is anticipated to be operational by 2033 with both units operational by 2034.

4.15.7 Based on the CEA scoping exercise, assessment of cumulative effects considers the cumulative impact magnitude and the sensitivity of the receptor to the impact. Sensitivity information is based on assessments within **Volume 2**, **Chapter 22** of the **ES**.

b) Assessment of potential cumulative effects on water quality

4.15.8 The ZOI for water quality impacts was determined as being a 10km radius of the proposed development. Details were gathered on projects within this area.

4.15.9 Projects with active environmental permits for discharges to surface water and groundwater, including those associated with Sizewell B have been considered as part of the baseline for water quality and are not considered further in terms of CEA.

i. Construction

4.15.10 The project screening exercise identified four projects that have the potential for a spatial overlap with the ZOI for water quality issues in terms of changes is suspended sediments during the construction phase. These projects are;

- East Anglia ONE North (ID 13);
- East Anglia TWO (ID 14);
- Eurolink National Grid Interconnector (ID A112); and
- Nautilus National Grid Interconnector (ID A111).

4.15.11 East Anglia ONE North offshore wind farm and East Anglia TWO offshore wind farm are Tier 4 projects with DCO applications submitted in October 2019. The nearest point of the offshore cable corridor is 550m from infrastructure associated with the proposed development. As such the potential impacts from construction and operational maintenance of the offshore cables is considered. Both interconnector projects are Tier 5 projects with minimal amounts of information on construction and maintenance activities available.

4.15.12 Cable laying activities (including trenching), which would cause sediment disturbance resulting in increases in suspended sediment concentrations potentially effecting water quality. A pre-lay grapnel run would proceed the installation of the offshore wind farm export cables and could disturb the seabed up to a depth of 3m. At any given location along the cable route the sediment release volumes would be low and confined to near the seabed. A summary of the suspended sediments from the East Anglia ONE North and East Anglia TWO Environmental Statements (Ref. 4.17 and Ref. 4.18) is provided:

- In shallow subtidal environments (less than 5m lowest astronomical tide) suspended sediments would peak at 400mg/l. Plumes would be localised, extending to less than 1km from the trenching activity and persist for a few hours.
- In deeper waters (greater than 20m lowest astronomical tide) suspended sediments would typically be at less than 100mg/l, higher concentrations would occur within tens of meters of the trenching.

- Within 180 hours of the activity, sediment plumes would have fully dispersed.

4.15.13 Increases in suspended sediments and sedimentation from the proposed development is also predicted to be short-term and localised with conditions returning to baseline shortly after dredging activities ceasing. Furthermore, the magnitude of impacts is relatively small in comparison to high baseline concentrations with mean suspended sediment concentrations of ca. 500mg/l at the seabed near the offshore infrastructure and peaks over 2,000mg/l, as discussed in **Chapter 22** of **Volume 2** of the **ES**. As such, significant cumulative effects on water quality are not anticipated should activities resulting in increases in suspended sediment temporally overlap with other developments.

4.15.14 It is possible that there will be ongoing maintenance of existing cables in the ZOI (e.g. for Greater Gabbard offshore wind farm and Galloper offshore wind farm), however it is not possible to quantify these (albeit they are likely to result in smaller impacts than during installation phases). Increases in suspended sediments from dredging activities associated with the proposed development are predicted to be short-term and localised with conditions returning to baseline within days of dredging activities ceasing, as provided in **Volume 2, Chapter 21** of the **ES**. As such, the cumulative effects would remain the same as Sizewell C alone, i.e. minor adverse and **not significant**.

ii. Commissioning

4.15.15 During the commissioning phase, cold flush testing discharges would release small quantities of conditioning chemicals from the combined drainage outfall. Commissioning discharges have been assessed in detail in **Volume 2**, **Chapters 21** and **22** of the **ES** against background conditions including existing Sizewell B discharges. No other developments would discharge within the ZOI and no further CEA is undertaken.

iii. Operational

4.15.16 During the operational phase, cooling water discharges from the proposed development would release heated cooling water and chemical discharges, including chlorinated contaminants and hydrazine. The existing Sizewell B station forms part of the baseline environment against which discharges from the proposed development have been assessed in detail in **Volume 2 Chapters 21** and **22** of the **ES**. No other developments would discharge within the ZOI and no further CEA is undertaken.

c) Assessment of potential cumulative effects on benthic ecology

4.15.17 The ZOI for cumulative effects on benthic ecology from the proposed development and third-party developments is the GSB.

4.15.18 Based on the results of benthic ecology assessments provided in **Volume 2**, **Chapter 22** of the **ES**, the CEA for benthic communities considered eight types of impact from all stages of any project where there is the potential to overlap with the proposed development, as discussed in **Appendix 4C** of this volume.

4.15.19 The project screening exercise identified four projects that have the potential for a spatial overlap with the ZOI for benthic ecology receptors during the construction phase in terms of changes is suspended sediments, sedimentation rate changes and physical change to another seabed type, as discussed in **Appendix 4C** of this volume. These projects are;

- East Anglia ONE North;
- East Anglia TWO;
- Eurolink National Grid Interconnector; and
- Nautilus National Grid Interconnector.

4.15.20 Eurolink National Grid Interconnector and Nautilus National Grid Interconnector are Tier 5 with limited information available. East Anglia ONE North offshore wind farm and East Anglia TWO offshore wind farm are Tier 4 projects with DCO applications submitted in October 2019. The offshore wind farm locations at 50km and 35km, respectively from the proposed development. The nearest point of the offshore cable corridor is 550m from infrastructure associated with the proposed development and landfall for the East Anglia ONE North and East Anglia TWO export cables would be north of Thorpeness, as discussed in **Appendix 4C** of this volume. Cable laying activities (including trenching) and maintenance of existing cables in the ZOI, resulting in increases in SSC and sedimentation from sediment disturbance, and possible changes in habitat (due to cable protection) have the potential for spatial and temporal overlap with the ZOI.

4.15.21 A pre-lay grapnel run would precede the installation of the offshore wind farm export cables and could disturb the seabed up to a depth of 3m. At any given location along the cable route the sediment release volumes would be low and confined to near the seabed. A summary of the suspended sediments

from the East Anglia ONE North and East Anglia TWO Environmental Statements is provided:

- In shallow subtidal environments (less than 5m lowest astronomical tide) suspended sediments would peak at 400mg/l. Plumes would be localised, extending to less than 1km from the trenching activity and persist for a few hours.

- In deeper waters (greater than 20m lowest astronomical tide) suspended sediments would typically be at less than 100mg/l, higher concentrations would occur within tens of meters of the trenching.

- Within 180 hours of the activity, sediment plumes would have fully dispersed.

4.15.22 Increases in suspended sediments and sedimentation from the proposed development is also predicted to be short-term and localised with conditions returning to baseline shortly after dredging activities ceasing. Furthermore, the magnitude of impacts is relatively small in comparison to high baseline concentrations with mean suspended sediment concentrations of ca. 500mg/l at the seabed near the offshore infrastructure and peaks over 2,000mg/l, as discussed in **Chapter 22** of **Volume 2** of the **ES**. Therefore, the potential for significant cumulative effects is low. Changes in suspended sediments and are predicted to have a minor adverse/minor beneficial[3] effect on benthic receptors. Sedimentation rate changes are predicted to have a minor adverse effect on benthic receptors. Effects are **not significant**. The CEA is consistent with the assessment of effects from the proposed development alone.

4.15.23 Cable installation and protection measures for offshore wind farm export cables (e.g. the introduction of hard substrate) have the potential to result in a physical change in seabed type. Furthermore, where export cables reach landfall, intertidal habitat could be altered. In the predominantly soft sediment environment, cable burial through ploughing is anticipated (except for pipeline crossings), thus reducing the requirement for cable protection. The preparation of the seabed for cable laying may permanently change the baseline habitat, however in the dynamic environment the change in habitat

[3] Some species, such as *Sabellaria spinulosa,* may benefit from increases in suspended sediment concentrations and effects may be **minor beneficial** although **not significant**. Further details are provided in **Chapter 22** of **Volume 2** of the **ES**.

is likely to be small and support similar diversity. Landfall for the East Anglia ONE North and East Anglia Two export cables would be north of Thorpeness. Horizontal directional drilling would be applied, thereby eliminating the requirement for works or impact to the intertidal. As such, significant effects on benthic receptors are not anticipated. Physical change in seabed type is predicted to have a minor adverse effect on benthic receptors and is **not significant.** The CEA is consistent with the assessment of effects from the proposed development alone.

4.15.24 Operational maintenance of the existing cables in the ZOI including for Greater Gabbard offshore wind farm and Galloper offshore wind farm along with the proposed East Anglia ONE North and East Anglia TWO cables is feasible. There is no scheduled repair or replacement of the export cables for East Anglia ONE North and East Anglia TWO. Periodic inspection of all cables routes is anticipated. During inspection sections of cables would be uncovered, repaired and reburied. Maintenance impacts, including changes in suspended sediments and sedimentation rate changes are assumed to be smaller scale than during construction. Should such impact occur during the operational phase of the proposed development, the only activity with the potential to act cumulatively to increase suspended sediments and sedimentation rate changes would be occasional dredging for the BLF (deliveries anticipated every 5-10 years). The cumulative effects of cable maintenance and the short-term, localised effects from the proposed development are not considered to result in significant effects on benthic receptors.

d) Assessment of potential cumulative effects on fish

4.15.25 The assessment of effects on fish has been based upon a tiered approach, with consideration of pressures which could generate potentially significant cumulative effects to fish receptors at the following levels:

- The sea-area or regional stock/population level, considering effects on the viability of the stock/population.
- Localised displacement effects, with consideration of fish receptors as prey species for designated features such as seabirds or marine mammals and as fisheries resources.

4.15.26 CEA assessments for fish consider other developments with the potential for significant cumulative underwater noise impacts, notably offshore wind farms, that may be constructed within the same time frame as the BLF. During the operational phase, other developments that will abstract large

volumes of seawater with the potential to cause in-combination effects are also considered cumulatively with the proposed development. For example, the ICES stock unit for seabass means the proposed development and Hinkley Point C would effect fish from the same management unit. Accordingly, the cumulative effects of Sizewell C and Hinkley Point C impingement and entrainment are assessed together in a CEA context. The full scope of activities and associated pressures from the proposed development that are considered in the CEA are detailed in **Appendix 4C** of this volume. The following sections provide a summary of results for activities screened into the CEA.

i. Impact Assessment 1 – Underwater noise from piling

4.15.27 The timeline for the proposed development indicates there is the potential for pilling activities associated with the indicative construction window of the BLF to occur simultaneously with offshore wind farm (offshore wind farm) projects. The worst case temporal overlap of piling with the BLF includes the following offshore wind farm:

- Hornsea Project Two offshore wind farm;
- Dogger Bank Creyke Beck A offshore wind farm;
- Dogger Bank Teeside A offshore wind farm;
- Thanet Extension offshore wind farm;
- Hornsea Project Three offshore wind farm; and
- East Anglia THREE offshore wind farm, or Norfolk Vanguard offshore wind farm.

4.15.28 The current timeframes for East Anglia THREE and Norfolk Vanguard do not overlap, as detailed in **Appendix 4C** of this volume. The assessment considers fish in three hearing categories, the most sensitive being Category 1 which are 'fish with swim bladder or other air cavities to aid hearing' (e.g. herring).

4.15.29 The combined impact magnitude for the is assessed as low as piling would be intermittent and short-term, with a limited period of piling in the construction phase of the proposed development and the offshore wind farms listed.

4.15.30 The cumulative effects of impact piling of the proposed development and the six offshore wind farms listed on fish receptors is predicted to be the same as Sizewell C alone, i.e. minor adverse and **not significant**.

ii. Impact Assessment 2 – Entrainment of fish receptors

4.15.31 Entrainment and impingement of adult and juvenile fish and ichthyoplankton can result from seawater abstraction. Entrainment assessments have been described in detail for the proposed development in **Volume 2, Appendix 22G** of the **ES**. Assessments incorporate elements of species sensitivity to entrainment pressures and the magnitude of the impact to determine the annual effect contextualised against the relevant species stock/population.

4.15.32 Information on licenced seawater abstraction has been obtained and further details on projects considered in the CEA is provided in **Appendix 4C** of this volume.

4.15.33 A large number of projects have existing licences and have been considered as part of the baseline for the proposed development. The operation of the Tier 2 project, Hinkley Point C, has the potential to act cumulatively with the proposed development in relation to entrainment of fish eggs, larvae and juveniles.

4.15.34 The sensitivity of fish receptors is detailed in **Volume 2, Chapter 22** of the **ES**. Seabass (*Dicentrarchus labrax*) is the only taxa where the stock area overlaps both the proposed development and Hinkley Point C. Effects on seabass populations due to entrainment of ichthyoplankton has been assessed **and negligible effects** are concluded at the stock/populations level. **No significant cumulative effects** to seabass stocks are predicted.

iii. Impact Assessment 3 – Impingement of fish receptors

4.15.35 The operation of the proposed development and Hinkley Point C has the potential to act cumulatively, in relation to impingement of juvenile and adult fish. Impingement assessments have been described in detail for the proposed development in **Appendix 22I** of **Volume 2** of the **ES**. Assessments incorporate elements of species sensitivity to impingement pressures and magnitude of the impact to determine the annual effect contextualised against the relevant species stock/population.

4.15.36 Thresholds have been selected based upon internationally accepted scientific practice for the sustainability of fish stocks under anthropogenic pressures. For commercially exploited stocks and conservation species (which includes stocks that are not currently exploited): 1% of the spawning

stock biomass or, as a highly conservative proxy, 1% of international landings of the stock has been applied as the initial trigger for significant effects.

4.15.37 The impingement CEA is undertaken with the inclusion of low velocity site entry intakes and FRR at the proposed development and at Hinkley Point C. The mitigation is described fully in **Volume 2**, **Chapter 22** of the **ES** for the proposed development.

4.15.38 Stocks that coincide geographically with the proposed development and Hinkley Point C have been considered in the impingement assessment and have been identified as;

- Seabass (*Dicentrarchus labrax*);
- Thin-lipped grey mullet (*Liza ramada)*; and
- European eel (*Anguilla anguilla*).

4.15.39 Water abstraction and resulting impingement of juveniles and adults would occur throughout the operational lifetime of the proposed development and Hinkley Point C.

4.15.40 Impingement of seabass (as a % of spawning stock biomass) with full mitigation is predicted to be 0.28% for the proposed development. However, seabass are not uniformly distributed across the Greater Sizewell Bay with evidence suggesting juvenile seabass are attracted to the warm water effluents of Sizewell B in Winter. Accounting for the greater distribution of seabass in the inshore waters away from the Sizewell C intakes, impingement predictions are estimated to be as low as 0.03% of spawning stock biomass, as discussed in **Chapter 22** of **Volume 2** of the **ES** and the associated **Appendix 22I**, and 0.011% for Hinkley Point C. The cumulative effects are well below the 1% threshold for effects. With consideration of the current status of the seabass stock and the duration of the impact, minor adverse effects are predicted to seabass stocks. This is the same as Sizewell C alone.

4.15.41 Impingement losses of thin-lipped grey mullet for the proposed development is considered to be 0.52% of landings and 0.1% of an estimated spawning stock biomass, as detailed in **Appendix 4C** of this volume. Trend data at Hinkley Point C has concluded negligible effects. As an unexploited stock, a 10% of spawning stock biomass threshold is considered an appropriate threshold for significant effects, as discussed in **Chapter 22** of **Volume 2** of the **ES** and associated **Appendix 22I**. Negligible effects are predicted for

thin-lipped grey mullet stocks and effects are **not significant.** This is the same as for Sizewell C alone.

4.15.42 The predicted impingement for the proposed development alone is 0.15% spawning stock biomass for the Anglian River Basin District, based on silver eel biomass estimates. Impingement for Hinkley Point C is predicted to be 0.043% of the independent stock estimate. Minor adverse effects are predicted for European eel stocks for the proposed development in conjunction with Hinkley Point C and are **not significant.** This is the same as for Sizewell C alone.

iv. Entrapment

4.15.43 Some species of fish are subject to both entrainment and impingement depending on the size and distribution of different life-history stages. The in-combination effects from a single development is termed 'entrapment'.

4.15.44 For the species considered in a CEA context, entrainment has a negligible additive effect on impingement effects alone, as discussed in **Chapter 22** of **Volume 2** of the **ES** and associated **Appendix 22I**, and entrapment is not considered further.

e) Assessment of potential cumulative effects on marine mammals

4.15.45 Three species of marine mammals have been included as key taxa within the EIA of the proposed development. These include harbour porpoises (*Phocoena phocoena),* grey seal (*Halichoerus grypus*) and harbour seal (*Phoca vitulina*). Baseline assessments and receptor specific effects arising from the proposed development is provided in **Volume 2**, **Chapter 22** of the **ES**.

4.15.46 All three species of marine mammals are afforded protected under the European Council Directive 92/43/ECC on the Conservation of natural habitats and of wild fauna and flora (Habitats Directive) as Annex II species.

4.15.47 The Southern North Sea SAC, designated for harbour porpoise, is adjacent to the proposed development. One of the conservation objectives of the SAC is to prevent significant noise disturbance to harbour porpoise. Cumulative impacts of the proposed development in conjunction with other projects are considered in relation to the conservation objectives of the designated site, and at a wider scale to account for population density effects applying the North Sea Management Unit. The North Sea Management Unit reference population is 345,373 porpoise, as detailed in **Appendix 4C** of this volume. Potential effects on harbour porpoise in relation to the conservation

objectives of the site are provided in further detail in the **Shadow HRA** (Doc Ref. 5.10).

4.15.48 A similar approach is applied for seals with impacts contextualised against the relevant management units and is considered to be a precautionary assessment as seals are less sensitive than harbour porpoise to the underwater noise impacts associated with the proposed development.

4.15.49 To contextualise effects on highly mobile marine mammals the population management units were applied. The North Sea Management Unit is considered the appropriate area for assessment of effects on harbour porpoise populations. The UK south-east England Management Unit region is considered for harbour seals (4,965 seals), whilst the south-east England Management Unit, north-east England Management Unit, and east coast of Scotland Management Unit regions are considered for grey seals (19,372). See **Appendix 4C** of this volume for further details.

4.15.50 Based on the assessment of effects presented in **Volume 2**, **Chapter 22** of the **ES**, the following impacts on marine mammals have been taken forward in the CEA;

- underwater noise from piling on harbour porpoise;
- underwater noise from piling on phocid seals; and
- changes in prey availability (indirect impact from impingement / entrainment and underwater noise).

4.15.51 The cumulative assessment of underwater noise considers the potential disturbance of harbour porpoise and seals during piling operations from the proposed development and other projects screened into the CEA that could be piled at the same time, as detailed in **Appendix 4C** of this volume.

4.15.52 The CEA has been based on single piling of the BLF at the proposed development, i.e. one piling vessel installing a single pile at a time. The worst-case scenario of cumulative auditory effects assumed a maximum of five piles installed in a given 24-hour period (the period for modelling cumulative auditory effects) in shallow water using relatively small hammer energies (200kJ hammer energy being considered as the worst case). Under such circumstances pilling would be completed within three days.

4.15.53 The CEA has been undertaken using single pile installation (i.e. one piling vessel in operation on each project) at the proposed development and at offshore wind farm projects.

4.15.54 Impact magnitude has been assigned using the same methodology as that recently used in the assessments for Norfolk Vanguard and Norfolk Boreas considering the total area of auditory impacts and the proportion of the reference population of marine mammals exposed to pilling noise, as provided in **Table 14.4** and discussed in **Appendix 4C** of this volume.

Table 4.14: Assigning impact magnitude for noise assessments relative to the reference population.

Impact Magnitude.	Percentage of Reference Population Disturbed.
Negligible (here Very Low).	<1% of the reference population.
Low	1-5% of the reference population.
Medium	5-10% of the reference population.
High	>10% of the reference population.

i. Impact Assessment 1 – Underwater noise from piling on harbour porpoise

4.15.55 Two methods have been used for the assessment. Offshore wind farm developments (e.g. Norfolk Vanguard) have previously applied a population approach to determines the total number of harbour porpoise effected by simultaneous piling activities within the management unit. The second approach considers the area of the SAC impacted in relation to the draft thresholds for noise disturbance produced by the Joint Nature Conservation Committee - full details of the assessment are provided in **Appendix 4C** of this volume.

4.15.56 Following the submission of the Environmental Statement for the Norfolk Vanguard offshore wind farm and the advice given by statutory nature conservation bodies, a similar approach to the underwater noise assessment has been undertaken using the following parameters:

- a potential impact area during single pile installation, based on a radius of 26km from each offshore wind farm piling location (2,124km^2).

4.15.57 In the case of the relatively small-scale underwater noise impact areas associated with the proposed development, the predicted cumulative (24 hour) auditory impact range for temporary threshold shift for stationary harbour porpoises and seals is applied for the worst-case pilling scenarios. Fleeing models predict no permanent threshold shift and spatially limited temporary threshold shift cumulative auditory impact zones for piling associated with the proposed development, as described in **Appendix 22L** of **Volume 2** of the **ES**. However, the fleeing model assumes fleeing behaviours may occur up to distance of 25km, which is well beyond the predicted range of auditory effects. Therefore, the stationary auditory impact zones for temporary threshold shift are applied as a precautionary assessment of temporary auditory effects for animals that remain within the ensonified area for the duration of pilling. Advice on the conservation objectives of the Southern North Sea SAC was produced in March 2019 (Doc Ref. 5.10). Specifically, in relation to conservation objective two (no significant disturbance of the species) disturbance is considered to be significant if it leads to the exclusion of harbour porpoise from a significant proportion of the site. A detailed assessment of effects from the proposed development on European Marine Sites, including the Southern North Sea SAC is provided in the **Shadow HRA** (Doc Ref. 5.10).

4.15.58 Draft statutory nature conservation body advice suggests noise disturbance within an SAC from a plan/project individually or in combination is significant if it excludes harbour porpoises from more than:

- 20% of the relevant area[4] [winter area] of the site in any given day[5]; and
- an average of 10% of the relevant area of the site over a season.

4.15.59 A Rochdale envelope approach can be applied to consider the worst-case scenario for the duration of effects (12 piles) and the worst case for cumulative auditory effects. The worst-case scenario of cumulative auditory

[4] The relevant area is defined as that part of the SAC that was designated on the basis of higher persistent densities for that season (Summer defined as April to September inclusive, Winter as October to March inclusive). The proposed development is within the Winter area.
[5] The assessment is only applicable for habitats regulations assessments (HRAs) due to impracticality of daily noise limit management of activities, but retrospective compliance analysis advised. Herein, an indicative assessment is provided further details are available in the **Consultation Report** (Doc Ref. 5.10).

effects assumes a maximum of five piles installed in a given 24-hour period (the period for modelling cumulative auditory effects). Under such circumstances pilling would be completed within three days. The cumulative noise assessment (3 days of piling) results in the greatest auditory effect ranges and is considered as the worst-case CEA. As the worst-case auditory impacts from piling for the proposed development is expected to last no more than three days the assessment focusses on the first of the two conservation objectives.

4.15.60 Under the population density approach there are a total of seven projects where the timeline for piling has the potential to overlap with piling during the indicative construction window of the BLF at the proposed development. However, the potential worst-case scenario for other projects that could simultaneously be piling at the same time as the proposed development in the Southern North Sea SAC includes only six projects. This is because the current timeframes for East Anglia THREE and Norfolk Vanguard do not overlap. The assessment has been undertaken using the following projects to represent the worst-case scenario, as illustrated on **Figure 3** of **Appendix 4C** of this chapter:

- Hornsea Project Two offshore wind farm;
- Dogger Bank Creyke Beck A offshore wind farm;
- Dogger Bank Teeside A offshore wind farm;
- Thanet Extension offshore wind farm;
- Hornsea Project Three offshore wind farm; and
- Norfolk Vanguard offshore wind farm.

4.15.61 East Anglia ONE North and East Anglia TWO offshore wind farms are Tier 4. Offshore construction, including pilling, is anticipated 2026-2028 for East Anglia ONE North and 2025-2027 for East Anglia TWO. Piling is not anticipated to overlap with the construction of the BLF in the early construction phase, as detailed in **Appendix 4C** of this volume.

4.15.62 Using the criteria in **Table 4.14**, the magnitude of impact in a single piling scenario is assessed as low as the maximum number of harbour porpoise that could potentially be disturbed is 10,782 (3.12% of the reference population). The proposed development has the potential to expose 62

animals (stationary temporary threshold shift model) and contributes just 0.58% of the total number of animals disturbed, as detailed in **Appendix 4C** of this volume.

4.15.63 The potential effects of underwater noise from piling range from direct injury and/or auditory damage at close range to short-term behavioural effects. Changes in the behaviour of harbour porpoises in response to pile driving have been reported at multiple offshore wind farm sites. However, harbour porpoises returned to the area once the piling noise stopped.

4.15.64 For the purpose of the CEA, displacement at a radius of 26km is assumed for other projects. This temporary avoidance would cause disturbance but minimise acoustic injury. The auditory impact rages applied for the proposed development are based on the theoretical model assuming no fleeing behaviour and represent the maximum temporary threshold shift ranges. Maximum temporary auditory damage ranges from the proposed development and displacement behaviours from offshore wind farms mean harbour porpoises have the potential to recover and sensitivity is adjudged as medium.

4.15.65 The cumulative effects of piling events at the proposed development with six offshore wind farms is assessed as having minor adverse effects for harbour porpoise. Therefore, no significant effects pertaining to the disturbance of the North Sea Management Unit harbour porpoise population are predicted.

4.15.66 When the area impacted is considered in relation to the conservation objectives pertaining to underwater noise disturbance, two projects could have potential to overlap with piling at the proposed development within the winter area. These are:

- Thanet Extension offshore wind farm; and
- East Anglia THREE[6] offshore wind farm.

4.15.67 The total area impacted within the winter area is 2,144km^2, which accounts for 16.9% of the SAC. The proposed development would contribute less than 1% of the total area effected and only for three days if piling were to occur in winter. Thus, the proposed development, alone or in combination with other

[6] Based on the current timeframes East Anglia THREE and Norfolk Vanguard do not temporally overlap, as detailed in **Appendix 4B** of this volume.

plans or projects, would not result in significant noise disturbance within the winter area.

ii. Impact Assessment 2 – Underwater noise from piling on phocid seals

4.15.68 Full details of the assessment can be found in **Appendix 4C** of this volume.

4.15.69 The potential effects of underwater noise from piling range from direct injury and/or auditory damage at close range to short-term behavioural effects. Behavioural changes, for example avoidance, have also been observed in harbour seals as a result of pile driving up to 25km from the sound source. However, seals returned to the area shortly after piling ceased (within two hours). For the purpose of the CEA, displacement at a radius of 26km is assumed for other projects. This temporary avoidance would cause disturbance but minimise acoustic injury. Following the same rationale as for the harbour porpoises, seals are assigned medium sensitivity to impacts from piling.

4.15.70 The magnitude of the potential disturbance of grey and harbour seals has been estimated for individual offshore wind farm projects based on the criteria in **Table 4.14**.

4.15.71 There are a total of six projects where the timeline for piling has the potential to overlap with piling window at the proposed development as detailed in **section 4.15.60**.

4.15.72 The maximum number of grey seals that could potentially be disturbed as a result of piling is 646 (3.34% of the reference population[7]). The magnitude is assessed as low.

4.15.73 The maximum number of harbour seals that could potentially be disturbed as a result of single piling is 165 (3.336% of the reference population[8]) and 330 (6.642% of the reference population) as a result of concurrent piling. The magnitude is assessed as low for piling.

4.15.74 The relative contribution of the proposed development to underwater noise is extremely small (displacement (of less) than one seal of each species).

[7] Reference populations for grey seals are based on the most recent counts for the south-east England Management Unit (8,716), north-east England Management Unit (7,004) and east coast of Scotland Management Unit (3,652) = 19,372 grey seals, as detailed in **Appendix 4C** of this volume.

[8] The harbour seal reference population is based on the most recent count data for the South-east England Management Unit = 4,965 harbour seals, as detailed in **Appendix 4C** of this volume.

Removing the proposed development from the assessment would still result in the same magnitude outcome.

4.15.75 The cumulative effects of piling events at the proposed development with six offshore wind farms is assessed as having minor adverse effect**s** for grey and harbour seals. Effects are **not significant** and the same assessment outcome as for as Sizewell C alone.

iii. Impact Assessment 3 – Changes in prey availability (indirect impact) due to prey entrapment and underwater noise

4.15.76 As top predators, marine mammals are influenced by availability and presence of their prey. The CEA for the effects of underwater noise from piling on fish detailed in **section 4.15.30** concludes that no significant effects are predicted at the stock/population level. Therefore, it is reasonable to conclude that, as the auditory and behavioural impact zones are smaller for fish than marine mammals, and as there is no significant effect at the stock/population level then there would be no significant impact in terms of prey availability.

4.15.77 The cumulative effects assessment for impingement and entrainment of selected fish species at the relevant stock/population level concludes negligible effects to minor adverse effects. Therefore, entrapment losses are unlikely to represent a significant change in the availability of prey. This is the same as for Sizewell C alone.

f) Assessment of potential cumulative effects on commercial and recreational fisheries

4.15.78 The ZOI for cumulative effects on commercial and recreational fishing activities is considered to be the GSB.

4.15.79 Pressures have been considered where relevant for commercial fisheries receptors (netters, potters and longliners) and recreational fisheries receptors (recreational fishing vessels and beach anglers) during the construction and operational phases.

4.15.80 The project screening exercise identified four projects that have the potential for a spatial overlap with the ZOI for commercial and recreational fisheries in terms of temporary displacement of fishing activities during the construction phase, as detailed in **Appendix 4C** of this volume. These projects are;

- East Anglia ONE North;

- East Anglia TWO;
- Eurolink National Grid Interconnector; and
- Nautilus National Grid Interconnector.

4.15.81 East Anglia ONE North offshore wind farm and East Anglia TWO Offshore Wind Farms are Tier 4 projects with DCO applications submitted in October 2019. The offshore cable corridor for East Anglia ONE North and East Anglia TWO is located within the GSB and ZOI for fishing activities, with landfall anticipated to be north of Thorpeness. As such the potential impacts from construction and operational maintenance of the offshore cables is considered.

4.15.82 Both interconnector projects are in the very early stages of planning and as such are also considered as Tier 5 projects. Details of any construction or operational and maintenance activities for these developments are currently unknown.

4.15.83 Any restrictions to fishing areas are predicted to be short-term and localised. Once construction and maintenance works are complete activities such as the potting and netting currently undertaken would be able to resume. As such, significant effects on commercial and recreational fisheries are not anticipated.

4.15.84 During the 60-year operational life of the proposed development maintenance of the offshore cooling water infrastructure. During maintenance of offshore infrastructure hierarchical safety buffer zones of approximately 250m to 500m depending on the activity would likely be applied surrounding construction vessels. These safety buffer zones would be implemented through Notice to Mariners (NtM) and may result in temporary loss of access to fishing areas. EDF Energy has a history of offshore operations within the area and has developed and maintained communications with fishers prior to offshore works. Such communications would be expected to continue throughout the operational phase for maintenance activities.

4.15.85 Activities from other developments include maintenance of existing cables in the GSB (for example for Galloper Offshore Wind Farm), which could occur during the operational phase. However, any restrictions of fishing activity are predicted to be short-term and localised, and similar or smaller scale to during the construction phase. Significant effects on commercial and recreational fisheries are not anticipated.

g) Summary of assessment of potential cumulative effects on marine ecology and water quality

4.15.86 A detailed summary of the potential cumulative effects on marine ecology and water quality is presented in **Table 21** of **Appendix 4C** of this volume and summarised in **Table 4.15**.

Table 4.15: Summary of potential cumulative effects.

Residual Effects	Receptors
No significant impacts.	Commercial and recreational fisheries.
Negligible effects.	Ichthyoplankton (seabass).
Minor adverse effects.	Water quality, benthic ecology, fish receptors (underwater noise from piling), seabass and European eel (impingement), harbour porpoise (underwater noise from impact piling) and harbour and grey seals (underwater noise from impact piling).

4.16 Marine Historic Environment

4.16.1 The assessment of the marine historic environment is focused upon the proposed infrastructure, and potential impact upon historic environment assets, within the red line boundary. The activities identified within the wider cumulative effects assessment are not identified as having additive or interactive environmental effects upon the marine historic environment at these locations which would surpass / enhance those proposed by **Volume 2, Chapter 23** of the **ES**.

4.17 Marine Navigation

a) Methodology

i. Zone of Influence

4.17.1 For marine navigation, the Zone of Influence (ZOI) was assumed to be 10 nautical miles (nm), i.e. a scheme was considered to have the potential for cumulative effects if any marine aspect of the scheme is within 10nm of the Sizewell C main development site. Schemes outside of the ZOI but for which construction / maintenance vessels may cross the route taken by abnormal indivisible load (AIL) delivery vessels (i.e. if the transhipment base is at Harwich) were also included.

ii. General methodology

4.17.2 The short list of plans, projects and programmes used to identify possible cumulative effects with the Sizewell C development is located in **Chapter 1, Appendix 1B** of this volume**.**

4.17.3 The assessment of the marine navigation cumulative effects has been undertaken in accordance with the marine navigation assessment methodology provided in **Volume 1, Appendix 6T** of the **ES.**

b) Assessment of potential cumulative effects during construction

4.17.4 During construction cumulative effects relating to marine navigation may arise in-combination with the following non-Sizewell C schemes:

- East Anglia THREE Offshore Wind Farm (ID 575);
- East Anglia ONE North (ID 13) and East Anglia TWO Offshore (ID 14) Wind Farms;
- Nautilus Interconnector (ID A111);
- Eurolink Interconnector (ID A112);
- Greater Gabbard Extension Offshore Wind Farm (ID A113);
- Galloper Extension Offshore Wind Farm (ID A114); and
- Eastern Area Navigation Markers (ID 645a and 645b).

4.17.5 Harwich/Felixstowe Outer Channel Dredge Disposal (ID646) Receptors which could potentially experience cumulative effects relating to marine navigation generated during construction in combination with the short listed non-Sizewell C schemes include the following:

- Passing vessels.
- Fishing and recreational vessels.

4.17.6 These receptors may experience the following cumulative impacts:

- Increased collision risk (passing vessels & vessels actively fishing with AIL delivery vessels).
- Increased collision risk (passing vessels & vessels actively fishing with installation vessels).
- Increased collision risk (passing vessels & vessels actively fishing with dredgers).
- Disruption to fishing and recreational activities.

4.17.7 Cable landfall for East Anglia THREE is planned at Bawdsey, Suffolk (approximately 15-16nm south of Sizewell C). As the cable corridor lies between Sizewell C and Harwich, construction, maintenance or repair works associated with the East Anglia THREE export cable could present an increase in collision risk from passing vessels with AIL delivery vessels, due to reduced sea room, if Harwich is chosen as the transhipment facility. However, due to the low number of vessels involved in deliveries relative to the number of vessels transiting within the area, the effect remains tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES**.

4.17.8 The East Anglia ONE North and East Anglia TWO wind farms are currently in the early planning stages. If these wind farms are granted consent, there may be an increase in collision risk from passing vessels with AIL delivery vessels if the construction period overlaps with the AIL delivery periods. Due to the low number of vessels involved in deliveries and the distance between the proposed developments, the effect remains tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.9 There is also the potential for the East Anglia ONE North or East Anglia TWO export cables to make landfall close to the main development site, with the current lease agreement adjacent to the main development site boundary. In this case, there may be cumulative impacts if construction or maintenance of the export cables overlaps with the construction period for Sizewell C. There is potential for increased collision risk with installation vessels and disruption to small craft activities in the area. Both operators are expected to follow best practice guidelines to minimise the risk of collision and thus the effects remain tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.10 The preferred option for the landfalls of the Nautilus and Eurolink Interconnectors is in the Leiston area and therefore within the Zone of

Influence. Both projects are currently at scoping stage, with connection expected in 2028 for Nautilus and 2030 for Eurolink, however limited information is available on construction works, including schedules. If cable installation coincides with the Sizewell C construction period, there could be increased collision risk with installation vessels, dredgers or AIL delivery vessels, as well as increased disruption to small craft activities. All operators are expected to follow best practice guidelines to minimise the risk of collision and thus the effects remain tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.11 Expansion of the Greater Gabbard and Galloper Offshore Wind Farms will include cable installation. Landfall is planned adjacent to the current landfalls for the Greater Gabbard and Galloper export cables, within 1nm south of the Sizewell C main development site boundary. The Greater Gabbard and Galloper extensions are currently in concept / early planning stages and therefore limited information on construction works, including schedules, is available. If cable installation for the export cables coincides with the Sizewell C construction period, there could be increased collision risk with installation vessels, dredgers or AIL delivery vessels, as well as increased disruption to small craft activities. Both operators are expected to follow best practice guidelines to minimise the risk of collision and thus the effects remain tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.12 The Environment Agency (Anglian Region) is undertaking ongoing maintenance works to inspect all navigation markers that are the responsibility of the Environmental Agency and undertake any repairs to markers that are failing. This includes maintenance of existing works at Minsmere Outfall, Southwold, to the north of the Sizewell C site, and Thorpeness Sluice and Aldeburgh to the south of Sizewell C. This work is scheduled to continue to October 2024. Therefore there may be an overlap of these maintenance works with the construction of the proposed development. This could cause an increase in disruption to small craft activities (e.g. fishing and recreational) if works were being carried out within close proximity. However due to the localised nature of these works and the distance from the Sizewell C site, the effect remains tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.13 Harwich Haven Authority are responsible for the disposal of maintenance dredging material from the Harwich / Felixstowe Outer Channel. They will dispose of all maintenance dredged material at the Inner Gabbard East disposal ground (TH056). This could cause a cumulative impact of increased collision risk with AIL delivery vessels during the construction phase if

Harwich is chosen as the transhipment facility for the AIL deliveries. However, since the traffic increase is expected to be slight, the effect remains tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES**.

c) Assessment of potential cumulative effects during construction

4.17.14 During the operation of the main development site, cumulative effects relating to marine navigation may arise in combination with the following non-Sizewell C schemes:

- East Anglia THREE Offshore Wind Farm;
- East Anglia ONE North and East Anglia TWO Offshore Wind Farms;
- Sizewell B Nuclear Power Station Decommissioning;
- Nautilus Interconnector;
- Eurolink Interconnector;
- Greater Gabbard Extension Offshore Wind Farm;
- Galloper Extension Offshore Wind Farm; and
- Harwich/Felixstowe Outer Channel Dredge Disposal.

4.17.15 Sensitive receptors which could potentially experience cumulative effects relating to marine navigation generated during operation in combination with the short listed non-Sizewell C schemes include the following:

- Passing vessels.
- Fishing and recreational vessels.

4.17.16 These receptors may experience the following cumulative impacts:

- Increased collision risk (passing vessels & vessels actively fishing with AIL delivery vessels).

- Increased collision risk (passing vessels & vessels actively fishing with installation vessels).
- Increased collision risk (passing vessels & vessels actively fishing with dredgers).
- Disruption to fishing and recreational activities.

4.17.17 Similar to the construction phase, any construction, maintenance or repair works associated with the East Anglia THREE export cable could present an increase in collision risk from passing vessels with AIL delivery vessels during the operational phase if Harwich is chosen as the transhipment facility. However, due to the low number of vessels involved in deliveries relative to the number of vessels transiting within the area, there is not expected to be any significant cumulative impact, the effect remains tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.18 If the East Anglia ONE North and East Anglia TWO wind farms are granted consent, there may be an increase in collision risk from passing vessels with AIL delivery vessels if the construction period overlaps with the AIL delivery periods during the operational phase. The effect remains tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES,** due to the low number of vessels involved in deliveries and the distance between the proposed developments.

4.17.19 There may be cumulative impacts associated with construction or maintenance of the East Anglia ONE North or East Anglia TWO export cables, if these works overlap with maintenance works for Sizewell C. There is potential for increased collision risk with maintenance vessels and disruption to small craft activities in the area. Due to the temporary nature of any maintenance works, the increased collision risk remains tolerable **(not significant)**, and the disruption to small craft activities remains broadly acceptable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.20 Decommissioning of Sizewell B (including offshore structures) is anticipated to commence in 2035. There is the potential for cumulative impacts if decommissioning of Sizewell B overlaps maintenance works for Sizewell C. This includes increased collision risk with installation / decommissioning vessels and increased disruption to fishing and recreational activities. Due to the temporary nature of any required maintenance, the increased collision risk remains tolerable **(not significant)**, and the disruption to small craft

activities remains broadly acceptable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.21 If installation of the Nautilus and Eurolink cables coincides with Sizewell C maintenance work or AIL delivery periods during the operational phase, there could be increased collision risk with maintenance vessels or AIL delivery vessels, as well as increased disruption to small craft activities. Due to the low number of vessels likely to be involved in maintenance work or AIL deliveries during the operational phase, and the temporary nature of the work, the increased collision risk remains tolerable **(not significant)**, and the disruption to small craft activities remains broadly acceptable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.22 If cable installation for the export cables for the Greater Gabbard and Galloper extensions coincides with Sizewell C maintenance work or AIL delivery periods during the operational phase, there could be increased collision risk with installation vessels or AIL delivery vessels, as well as increased disruption to small craft activities. Due to the low number of vessels likely to be involved during the operational phase, and the temporary nature of the work, the increased collision risk remains tolerable **(not significant)**, and the disruption to small craft activities remains broadly acceptable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.17.23 Harwich Haven Authority are responsible for the disposal of maintenance dredging material from the Harwich / Felixstowe Outer Channel. They will dispose of all maintenance dredged material at the Inner Gabbard East disposal ground (TH056). This could cause a cumulative impact of increased collision risk with AIL delivery vessels during the operational phase if Harwich is chosen as the transhipment facility for the AIL deliveries. However, since the traffic increase is expected to be slight, the effect remains tolerable **(not significant)**, as described within **Volume 2, Chapter 24** of the **ES.**

4.18 Radiological

4.18.1 As part of the process of issuing environmental permits to dispose of radioactive waste, the Environment Agency takes into account radioactive discharges from other installations, in combination with the development subject to the permitting process. This ensures that the relevant dose limits and dose constraints are not exceeded.

4.18.2 **Volume 2, Chapter 25** contains a summary of the radiological effects from the proposed development. This assessment was undertaken in support of the DCO as well as the Radiological Substances Regulations Environmental Permit application for the Sizewell C Project. The assessment includes

consideration of the combined impact with the existing neighbouring operational power station (Sizewell B). Sizewell A, the defueled nuclear power station further to the south of Sizewell B has been discounted from the cumulative effects as it will be in Care and Maintenance Phase, where the site will continue to be managed, monitored and maintained to ensure that it remains in a passively safe and secure state. This assessment shows the impacts of radioactive effluent discharges on human and non-human biota from the operation of Sizewell C nuclear power station alone and in combination with the neighbouring Sizewell B station are predicted to be very low (**not significant**).

4.18.3 Noting that no new nuclear developments were identified as undergoing planning applications in this region of the United Kingdom at the time of this assessment, no further potential for cumulative radiological effects have been identified for the Sizewell C nuclear power station, except for the in-combination effects reported in **Volume 2, Chapter 25** of the **ES**. Therefore, no additional radiological effects are reported in this chapter.

4.19 Climate Change

a) Assessment of potential cumulative effects during construction and operation.

i. Lifecycle greenhouse gas (GHG) impact assessment:

4.19.1 The receptor for the GHG impact assessment is the global climate. UK carbon budgets are used as a proxy to the global climate to assess the impact of the proposed development. Presenting the impact of the proposed development in the context of the UK carbon budgets is an inherently cumulative assessment and as such it is concluded that further assessment of cumulative GHG emissions is not applicable.

ii. In-combination Climate Change impact (ICCI) assessment:

4.19.2 The ICCI assessment draws on the Climate Change impacts on sensitive receptors in the surrounding environment during construction and operation as identified by other environmental assessments. The assessments undertaken within the technical sections of this chapter, therefore, cover the cumulative effects of the Sizewell C Project on Climate Change. The assessment has identified no changes in the significance of in-combination Climate Change impacts as a result of cumulative impacts.

iii. Climate Change Resilience (CCR) assessment:

4.19.3 The CCR assessment looks at the resilience of the Sizewell C Project during construction and operation to Climate Change impacts. The cumulative impact assessment is, therefore, not relevant for this assessment.

4.20 Major Accidents and Disasters

a) Methodology

4.20.1 The assessment of major accidents and disasters cumulative effects has been undertaken in accordance with the methodology provided in **Volume 1, Appendix 6X** of the **ES.**

4.20.2 Cumulative non-Sizewell C schemes could introduce new receptors for major accidents and disasters hazards and/or introduce new sources of hazards that the Sizewell C Project might be susceptible to. In addition, **Volume 2, Chapter 27** of the **ES** identifies resources and receptors within the study area for the Sizewell C Project which could be impacted in the event of a major accident or disaster due to the Sizewell C Project. These resources and receptors could potentially experience cumulative risks relating to major accidents and disasters during the construction and operation of Sizewell C Project in combination with any new risks introduced by the non-Sizewell C schemes. Resources and receptors that could experience cumulative effects include the following:

- populations, including members of the public and local communities;
- groundwater receptors;
- terrestrial (land) receptors, including agricultural land and sites of importance for nature conservation;
- freshwater receptors;
- marine receptors;
- built environment, including properties and built heritage assets; and
- critical infrastructure.

4.20.3 The short list of plans, projects and programmes provided in **Appendix 1B** of this volume identifies a number of schemes which would introduce new population receptors. However, these are considered unlikely to result in a substantial increase of population within the study area and therefore, have not been considered further on a scheme-by-scheme basis.

4.20.4 New infrastructure within the Zone of Influence of the Sizewell C Project which could act as receptors to major accidents and disaster hazards or create new major accident hazards that could affect the Sizewell C Project or the same receptors as the Sizewell C Project include the following:

- East Anglia ONE North (ID 13);
- East Anglia TWO (ID 14);
- Glemham Estate Reservoir, an 80,000 cubic metre reservoir covering an area of approximately 3.5 hectares, with the reservoir basin water surface area being 2.48 hectares (ID 195);
- Eurolink National Grid Interconnector (ID A112); and
- Nautilus National Grid Interconnector (ID A111).

4.20.5 In addition, decommissioning of Sizewell B station (ID 592) has been considered as a new potential source of hazards during the operation of the Sizewell C Project.

4.20.6 Cumulative effects may arise during the early years of construction, the peak of construction, the removal and reinstatement of temporary development at associated development sites and the main development site, and the operation of the Sizewell C Project, as described below.

4.20.7 New marine infrastructure that could result in cumulative marine navigation risks is considered in **section 4.18** of this chapter.

b) Assessment of potential cumulative effects of construction

i. Early years

4.20.8 The construction of non-Sizewell C schemes identified in **section 4.21(a)** above could potentially be concurrent with the early years of the construction

of Sizewell C, and, due to their proximity to the sites, may increase risk at surrounding receptors or provide new risks at Sizewell C Project sites.

4.20.9 The following risks could be increased as a result of the non-Sizewell C schemes listed above:

- fire and/or explosion at a neighbouring site resulting in injury or death of construction personnel;
- explosion and structural collapse at neighbouring sites resulting in injury or death of construction personnel;
- contamination or release of hazardous substances by off-site sources resulting in increased risk to the safety of members of public and site workers;
- construction accidents within the marine environment, resulting in a pollution incident;
- failure or loss of utilities (e.g. electricity, water or telecommunications) as a result of construction on neighbouring sites, limiting the ability of an emergency response plan and environmental and safety management systems to be implemented;
- local accident on motorways and major trunk roads due to increased construction traffic; and
- construction of the non-Sizewell C development limiting the ability of an emergency response plan to be implemented.

4.20.10 Cumulative effects on marine navigation are considered within **section 4.18** of this chapter.

4.20.11 Mitigation measures described within **Volume 2**, **Chapter 27** of the **ES** would be implemented as part of the construction of the Sizewell C Project to minimise the risk of a major accident hazard impacting the Sizewell C Project sites. For instance, a **Code of Construction Practice** (Doc Ref. 8.11) has been prepared setting out arrangements in case of an emergency, requirements for incident response, incident drills and auditing. An on-site 24/7 emergency response service would be provided at the main development site.

4.20.12 In addition, the non-Sizewell C schemes themselves will also require mitigation and control measures to be adopted during the construction. These mitigation measures would include: environmental measures secured through a Code of Construction Practice or equivalent and compliance with relevant legislation and regulatory requirements.

4.20.13 Therefore, it is expected that the non-Sizewell C schemes would not result in any new significant major accident risks that the Sizewell C Project sites would be susceptible to. Any combined risks with the Sizewell C Project would be tolerable if as low as reasonably practicable (ALARP) and **not significant**. Furthermore, as set out within **Volume 2, Chapter 27** of the **ES,** mitigation proposed by the Sizewell C Project during its construction would mitigate all risks to off-site receptors to tolerable or tolerable if ALARP **(not significant)**. No additional mitigation is considered to be required due to the construction of the non-Sizewell C schemes listed above.

ii. Peak years

4.20.14 During the peak of construction of Sizewell C (when all associated developments are operational and the main development site is under construction), cumulative risks relating to major accidents and disasters may arise in-combination with the non-Sizewell C schemes listed in **section 4.21(a)**. The non-Sizewell C schemes are assumed to have been constructed by the time of peak construction at the main development site and would, therefore, be operational themselves.

4.20.15 The following risks could be increased as a result of the operation non-Sizewell C scheme listed above:

- reservoir flooding;
- fire and/or explosion at a neighbouring site resulting in injury or death of Sizewell C personnel;
- explosion and structural collapse at neighbouring sites resulting in injury or death of Sizewell C personnel;
- failure or loss of utilities (e.g. electricity, water and telecommunications), limiting the ability of an emergency response plan and environmental and safety management systems to be implemented;

- contamination or release of hazardous substances by off-site sources resulting in increased risk to the safety of members of public and site workers;
- maritime pollution due to operational activities; and
- non-Sizewell C schemes limiting the ability of an emergency response plan to be implemented.

4.20.16 Cumulative effects on marine navigation are considered within **section 4.18** of this chapter.

4.20.17 As described in **section 4.21(b)(i)** above and further detailed within **Volume 2, Chapter 27** of the **ES,** mitigation measures have been embedded within the Sizewell C Project to minimise the susceptibility of the Sizewell C Project sites to major accident hazards from off-site sources. Furthermore, both the associated developments of the Sizewell C Project and the non-Sizewell C schemes would be operated in accordance with granted consents and licences and relevant regulations. Therefore, any combined risks with the Sizewell C Project would be tolerable if ALARP and **not significant**. Furthermore, as set out within **Volume 2, Chapter 27** of the **ES,** mitigation proposed by the Sizewell C Project during its construction would mitigate all risks to off-site receptors to tolerable or tolerable if ALARP **(not significant)**. No additional mitigation is considered to be required due to the operation of the non-Sizewell C schemes listed above.

c) Assessment of potential cumulative effects during operation of Sizewell C

4.20.18 During the operation of Sizewell C nuclear power station, cumulative risks relating to major accidents and disasters may arise in-combination with the operation of the non-Sizewell C schemes listed in **section 4.21(a)**. Risks which could be increased by the operation of non-Sizewell C schemes are the same as listed in **section 4.21(b)(ii)** above. In addition, Sizewell B power station would undergo decommissioning during the operation of Sizewell C.

4.20.19 During the operation of the Sizewell C Project, major accident risks from off-site sources would be controlled by measures embedded within the design in compliance with the Nuclear Site Licence. Periodic safety reviews would be undertaken to confirm the need for any additional mitigation. In addition, it is considered that the non-Sizewell C schemes would be operated in accordance with granted consents and relevant regulations. Prior to the

decommissioning of the Sizewell B station a suitable safety case would need to be produced to demonstrate that all risks have been eliminated, controlled or suitably mitigated under the Sizewell B station's Nuclear Site Licence. Therefore, any combined risks would be tolerable if ALARP and **not significant**. Furthermore, as set out within **Volume 2, Chapter 27**, mitigation proposed by the Sizewell C Project during its operation would mitigate all risks to off-site receptors to tolerable or tolerable if ALARP **(not significant)**. Therefore, no additional mitigation is considered to be required due to the operation of the non-Sizewell C schemes listed above.

4.21 Health and Wellbeing

a) Methodology

4.21.1 The assessment of the health and wellbeing cumulative effects has been undertaken in accordance with the health and wellbeing assessment methodology provided in **Volume 1, Appendix 6Y** of the **ES**.

4.21.2 The health and wellbeing cumulative assessment comprises the following health and wellbeing determinants:

- air quality;
- noise exposure;
- transport nature and flow rate;
- socio-economic factors (i.e. employment and GVA);
- radiological exposure;
- electromagnetic fields; and
- healthcare capacity.

4.21.3 For the majority of health determinants, the ZOI and specific cumulative developments relevant to the health and wellbeing cumulative assessment remain consistent with the technical disciplines which inform the health and wellbeing topic (namely, air quality, noise and vibration, transport, socio-economics and radiological).

4.21.4 For the remaining health determinants which are not influenced by other topics (electromagnetic fields, healthcare capacity and general stress and anxiety), the relevant cumulative developments considered as part of the health and wellbeing cumulative assessment comprise:

- East Anglia ONE (North) Offshore Windfarm (ID 13) and East Anglia TWO Offshore Windfarm (ID 14);
- East Anglia THREE Offshore Windfarm (ID 575) including Underground Cabling (ID 366);
- Galloper Extension offshore wind farm (ID A114); and
- Greater Gabbard Extension offshore wind farm (ID A113).

b) Cumulative health and wellbeing effects associated with changes to air quality

i. Assessment of potential cumulative effects during construction

4.21.5 As stated in **section 4.6** (Air Quality), during the busiest day in the peak construction year (2028) overall air quality at all receptor locations is not expected to exceed air quality objective values set to be protective of the environment and health. In addition, most receptors would experience a 'Negligible' change in air quality, with some receptors experiencing 'Moderate' beneficial effects and only a small number of properties along the A12 and the B1122 in Yoxford predicted to experience 'Minor' or 'Moderate' adverse effects on local air quality.

4.21.6 As a result, the cumulative health and wellbeing effects associated with air quality impacts would remain the same as for the main assessment – negligible adverse and **not significant**.

ii. Assessment of potential cumulative effects during removal and reinstatement of associated development sites

4.21.7 As stated in **section 4.6** (Air Quality), the likely scale of works associated with removal and reinstatement of temporary associated developments would generate a similar level of traffic to the construction phase of these developments. As a result, the cumulative health and wellbeing effects associated with air quality impacts would remain the same as for the main assessment – negligible adverse and **not significant**.

iii. Assessment of potential cumulative effects during operation

4.21.8 No cumulative effects on air quality are expected during operation of Sizewell C. As a result, there is no potential for associated cumulative health and wellbeing effects during operation.

c) Cumulative health and wellbeing effects associated with changes in noise exposure

i. Assessment of potential cumulative effects during construction and operation

4.21.9 As stated in **section 4.5** (Noise & Vibration), there is potential for cumulative noise impacts from construction of a number of approved but as yet, uncommenced developments in Leiston. However, due to the transient nature of the upgrade works which will move along the rail branch line as works are progress, cumulative noise impacts would only occur in one location for a short period of time, thereby limiting the opportunity for consequential health and wellbeing effects.

4.21.10 Operational noise impacts from both the rail and use of the housing would be lower than the noise during the construction phase. In addition, noise impacts associated with operation of the housing schemes are expected to be **significant** and therefore are not expected to be greater than those from the operation of the branch line. Therefore, consistent with the construction phase, the associated health and wellbeing effects would be limited.

4.21.11 There is also the potential for cumulative noise impacts during construction of the two village bypass, whereby noise generated by the agricultural reservoir (DC/18/0322/FUL) and barn conversions (to dwellings, DC/17/1331/FUL) could potentially occur at the same time as one another and/or at the same time as the two village bypass works. However, due to the temporary and intermittent nature of construction noise and the implementation of mitigation measures should cumulative noise impacts be significant (such as changing work phasing or methodology or providing additional local screening), no significant cumulative health and wellbeing effects are anticipated.

4.21.12 Operational noise impacts from the use of the reservoir would be lower than the noise during the construction phase. However, if the construction of the reservoir were to occur during operation of the two village bypass, there is the potential for cumulative noise impacts. However, taking into consideration the relatively short duration over which these two noise sources might occur simultaneously and the likely levels of noise from each, the overall cumulative effect is considered unlikely to be significant. Therefore, consistent with the construction phase, the associated health and wellbeing effects would be limited.

4.21.13 Cavan Cottage (High Street, Yoxford) has approval for a dwelling within its curtilage. However, construction noise (and the associated health and

wellbeing effects) resulting from Yoxford roundabout is not anticipated to not be significant. In addition, high levels of noise do not normally arise from construction of a single property. As such, no significant cumulative health and wellbeing effects are anticipated. Operational noise impacts from the use of the housing would be lower than the noise during the construction phase. Therefore, consistent with the construction phase, the associated health and wellbeing effects would be limited.

4.21.14 There is the potential for cumulative noise impacts during construction of an 82 bedroom hotel with car parking and associated works and construction and/or operation of the northern park and ride. However, due to the temporary and intermittent nature of construction noise and the implementation of additional mitigation measures should cumulative noise impacts be significant (such as changing work phasing or methodology or providing additional local screening), no significant cumulative health and wellbeing effects are anticipated. Operational noise impacts from both the park and ride and the use of the hotel would be lower than the noise during the construction phase. Therefore, consistent with the construction phase, the associated health and wellbeing effects would be limited.

4.21.15 Overall, the cumulative health and wellbeing effects associated with noise impacts would remain the same as for the main assessment at each associated development:

- moderate adverse and **significant** at receptors group locations near rail proposals (during construction);
- moderate adverse/beneficial and **significant** at receptors group locations near the two village bypass (during operation);
- minor adverse and **not significant** at receptors group locations near the Yoxford roundabout (during construction and operation); and
- minor adverse and **not significant** at receptors group locations near the northern park and ride (during construction).

d) Cumulative health and wellbeing effects associated with changes in transport nature and flow rate

i. Assessment of potential cumulative effects during construction

4.21.16 As per the approach in **Chapter 28**, **Volume 2** of the **ES**, the only health and wellbeing determinant associated with changes in road traffic movements assessed is accidents and road safety.

4.21.17 During early years construction, cumulative changes in traffic volume due to Sizewell C and Scottish Power would be negligible, whereby an increase of 1% or less is predicted on the A12, A1120, B1078 and B1119 and a 2% to 5% increase is predicted on the A1094, B1122, B1069 and B1125.

4.21.18 During peak construction, cumulative changes in traffic volume due to the Sizewell C Project and Scottish Power would remain negligible, whereby an increase of 1% is predicted on the A12, A1120 and B1119 and a 2% to 6% increase is predicted on the A1094, B1122, B1078, B1069 and B1125.

4.21.19 Overall, due to the length of the construction phase, the cumulative health and wellbeing effects associated with traffic impacts would remain the same as for the main assessment – minor adverse and **not significant**.

ii. Assessment of potential cumulative effects during operation

4.21.20 No cumulative effects associated with changes in transport nature and flow rate are identified by **section 4.3** (Transport). As a result, there is no potential for associated cumulative health and wellbeing effects.

e) Cumulative health and wellbeing effects associated with changes socio-economic factors

i. Assessment of potential cumulative effects during construction

4.21.21 There is the potential for cumulative socio-economic impacts associated with East Anglia ONE North, East Anglia TWO and East Anglia THREE. Relevant socio-economic factors to the cumulative health and wellbeing assessment comprise employment and GVA.

4.21.22 In terms of employment, as stated in **section 4.3** (Socio-economics), the peak years of Sizewell C are not anticipated to overlap with the combination of construction employment demand from East Anglia ONE North, East Anglia TWO and East Anglia THREE. In the years where there is an overlap, cumulative employment demand is less than Sizewell C's overall peak.

4.21.23 Regarding GVA contributions from, East Anglia ONE North, East Anglia TWO and East Anglia THREE, it is anticipated that supply chain spending and labour investment are likely to support similar sectors to Sizewell C, contributing somewhat to beneficial effects associated with Sizewell C.

4.21.24 There is also the potential for employment associated with outages and the decommissioning of Sizewell B to have a potential cumulative effect. As

Sizewell B would be operational up to 2035, there would be a cumulative effect from 2026. While outages would only be temporary and would require a primarily non-home-based workforce, it is anticipated that there would be substantial GVA increases of approximately 100% during these periods.

4.21.25 Overall, it is anticipated that the beneficial cumulative health and wellbeing effects associated with socio-economic factors would remain the same as for the main assessment – moderate beneficial and **significant**, as described within **Volume 2**, **Chapter 28** of the **ES**.

f) Cumulative health and wellbeing effects associated with changes in radiological exposure

i. Assessment of potential cumulative effects during operation

4.21.26 The assessment of health and wellbeing effects associated with changes in radiological exposure is not relevant to the construction assessment. Therefore, the assessment of cumulative effects is limited to the operational phase.

4.21.27 As stated in **Chapter 25** of **Volume 2** of the **ES**, the assessment includes consideration of the combined impact with the existing neighbouring operational power station (Sizewell B). There are no further cumulative developments which constitute potential radiation sources. As such, the cumulative health and wellbeing effects would remain negligible adverse and **not significant**, as described within **Volume 2**, **Chapter 28** of the **ES**.

g) Cumulative health and wellbeing effects associated with changes in electromagnetic field exposure

i. Assessment of potential cumulative effects during operation

4.21.28 The assessment of health and wellbeing effects associated with changes in electromagnetic field (EMF) exposure is not relevant to the construction assessment. Therefore, the assessment of cumulative effects is limited to the operational phase.

4.21.29 While there would be grid connection elements to East Anglia ONE North, East Anglia TWO, East Anglia THREE, Galloper Extension offshore wind farm and Greater Gabbard Extension offshore wind farm. As with the Sizewell C development, any electricity supply infrastructure would be compliant with guideline exposure levels to protect public health from EMF exposure by design, and there would be no additive or synergistic effects.

4.21.30 As such, the cumulative health and wellbeing effects would remain the same as for the main assessment – negligible adverse and **not significant**, as described within **Volume 2**, **Chapter 28** of the **ES**.

h) Cumulative health and wellbeing effects associated with the introduction of a temporary non-home-based construction workforce

i. Assessment of potential cumulative effects during construction

4.21.31 The assessment of health and wellbeing effects associated with the introduction of a temporary non-home-based construction workforce is not relevant to the operational assessment. Therefore, the assessment of cumulative effects is limited to the construction phase.

4.21.32 As stated in **Volume 2**, **Chapter 28** of the **ES**, an on-site occupational health service would be provided for the Sizewell C construction workforce to internalise a substantial proportion of the potential change in health care demand directly attributable to the non-home-based workforce at Sizewell C. While there is the chance of a minor residual effect, including from non-home-based workers' families / dependants, it is anticipated that a proportionate healthcare planning contribution would offset this.

4.21.33 As set out in **section 4.3**, it is not possible to determine the extent to which East Anglia ONE North, East Anglia TWO, East Anglia THREE will generate demand for a non-home-based workforce which may have the potential to overlap with Sizewell C's workforce and add to demand for public services, as the extent of the workforce required by these projects has not been considered to that level of granularity in the environmental statements for those projects.

4.21.34 However, while there is the potential for cumulative impacts on demand for local healthcare services associated with East Anglia ONE North, East Anglia TWO, East Anglia THREE, the contribution from Sizewell C would be minimal. Therefore, the cumulative health and wellbeing effects would remain the same as for the main assessment – minor adverse and **not significant**, as described within **Volume 2**, **Chapter 28** of the **ES**.

i) Cumulative quality of life and wellbeing effects associated with general stress and anxiety

4.21.35 Each individual development proposal has the potential to create stress and anxiety within a population during the planning application process and beyond. Due to their scale, larger projects may generate stress and anxiety.

4.21.36 In addition to Sizewell C, larger scale projects in the region comprise East Anglia ONE North, East Anglia TWO, East Anglia THREE, Galloper Extension offshore wind farm and Greater Gabbard Extension offshore wind farm. Cumulatively, the potential for stress and anxiety associated with both tangible and intangible aspects of the proposals may affect a larger population, for a longer period of time.

4.21.37 However, as with Sizewell C, all proposed developments are subject to rigorous investigation during the planning application process whereby local community risk perception and stress would be addressed through an EIA and various stages of consultation.

4.21.38 On the basis that each individual development would inherently manage stress and anxiety associated with the planning application process, the cumulative health and wellbeing effects would remain minor adverse and **not significant**, as described within **Volume 2**, **Chapter 28** of the **ES.**

4.22 Summary and conclusions

4.22.1 The majority of effects experienced on receptors as a result of the construction and operation of Sizewell C would not increase when in combination with the non-Sizewell C schemes identified in the long list.

4.22.2 Those effects that have been found to be greater in-combination with the non-Sizewell C schemes than for the proposed development alone are summarised in **Table 4.16** below.

Table 4.16: Summary of those cumulative effects found to be greater than for the proposed development alone.

Receptor / topic	Phase	Mitigation	Cumulative Effect
Conventional Waste and Material Resources			
Materials requirements: resource demands for concrete, steel, and bitumen.	Construction (early & peak years).	No further practicable and proportionate mitigation available.	**Significant** effect (all short-listed schemes).
Socio-economics			
Labour market: supply chain benefits and labour investment.	Construction (early & peak years).	None required.	Moderate beneficial, **significant** effect, regional scale (East Anglia THREE).
Labour market: supply chain benefits and labour investment.	Operation	None required.	Moderate beneficial, **significant** effect, local scale (East Anglia ONE North, East Anglia TWO, East Anglia THREE).

Receptor / topic	Phase	Mitigation	Cumulative Effect
Transport			
A12 at Little Glemham and Marlesford.	Peak construction.	Monitoring of construction programmes for Sizewell C Project and Scottish Power (East Anglia ONE North and East Anglia TWO) through traffic review group to determine if worst case traffic flows are likely to arise. If likely then additional freight management measures to be agreed with traffic review group and funded through the transport contingency fund, to be secured through the Section 106 Agreement, as discussed in draft Section 106 Agreement Heads of Terms appended to the **Planning Statement** (Doc 8.4).	Potential for cumulative moderate adverse effect on fear and intimidation with Sizewell C Project and East Anglia ONE North and East Anglia TWO.
Noise and Vibration			
Construction noise – Pond Barn Cottages.	Construction (early years).	Changes to phasing or methodology or screening.	**Not significant**, adverse.
Construction noise.	Construction.	Changes to phasing or methodology or screening.	**Not significant** adverse.
Landscape and Visual			
Visual Receptor Group 18: Knodishall and Aldringham.	Construction (early & peak years).	No further practicable and proportionate mitigation available.	Major – moderate adverse, **significant** visual effects (East Anglia ONE North and East Anglia TWO cable route and substation).
Visual Receptor Group 19: Aldringham Common and The Walks. Visual Receptor Group 20: Sizewell to Thorpeness Coast.	Construction (early & peak years).	No further practicable and proportionate mitigation available.	Major – moderate adverse, **significant** visual effect (East Anglia ONE North, East Anglia TWO, Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension Offshore Wind Farms).
Ancient Estate Claylands LCT.	Operation	No further mitigation proposed, as no significant effects identified.	Moderate adverse, **not significant** effect (East Anglia ONE North and East Anglia TWO substations).
Terrestrial Ecology and Ornithology			

Receptor / topic	Phase	Mitigation	Cumulative Effect
Designated sites: county wildlife sites.	Construction (early & peak years) Removal and reinstatement.	Minor adverse, **not significant** effect.	No further mitigation proposed, as no significant effects identified.
	Operation	Slight beneficial, **not significant** effect (long-term).	No further mitigation proposed, as no significant effects identified.
Farmland birds: loss of habitat; habitat fragmentation.	Construction (early years).	No further mitigation proposed, as no significant effects identified.	Minor adverse, **not significant** effect.
	Construction (peak years).		Minor adverse, **not significant** effect.
	Operation		Minor adverse, **not significant** effect.
Breeding birds: loss of habitat; habitat fragmentation.	Construction (early & peak years).	No further mitigation proposed, as no significant effects identified.	Minor adverse, **not significant** effect.
	Operation	No further mitigation proposed, as no significant effects identified.	Slight beneficial, **not significant** effect.
Bats: loss of habitat; lighting.	Construction (early) Removal and reinstatement.	Best available techniques and best practicable measures to manage noise levels; engagement of Local Planning Authorities Environmental Health Officer; lighting mitigation measures.	Minor adverse, **not significant** effect.
Amenity and Recreation			
Visual Receptor Group 18: Knodishall and Aldringham.	Construction (early & peak years).	No further mitigation proposed, as no significant effects identified.	Moderate - minor adverse, **not significant** effect (East Anglia ONE North and East Anglia TWO cable route and substation).
Visual Receptor Group 19: Aldringham Common and The Walks. Visual Receptor Group 20: Sizewell to Thorpeness Coast.	Construction (early & peak years).	No further practicable and proportionate mitigation available.	Major – moderate adverse, **significant** effect (East Anglia ONE North, East Anglia TWO, Nautilus Interconnector, Eurolink Interconnector, Greater Gabbard extension and Galloper Extension Offshore Wind Farms).

Receptor / topic	Phase	Mitigation	Cumulative Effect
Visual Receptor Group 18: Knodishall and Aldringham.	Construction (early & peak years).	No further mitigation proposed, as no significant effects identified.	Minor adverse, **not significant** effect (East Anglia ONE North and East Anglia TWO cable route and substation).
Terrestrial Historic Environment			
Archaeological heritage assets: disturbance of archaeological remains.	Construction (early years).	No further mitigation proposed, as no significant effects identified.	Minor adverse, **not significant** (Development at Levington Lane, Bucklesham).
Soils and Agriculture			
Invasive species: spread of invasive weeds.	Construction (peak years).	No further mitigation proposed, as no significant effects identified.	Minor adverse – negligible, **not significant**.
Marine Ecology and Water Quality			
Noise disturbance / injury: harbour porpoise; harbour seals.	Construction of the BLF.	Joint Nature Conservation Committee protocol for minimising the risk of injury to marine mammals from piling noise, as detailed in **Chapter 22** of **Volume 2** of the **ES**.	Minor adverse, **not significant** – harbour porpoise and harbour seals, noise from six offshore windfarms and proposed development. Short-term scenario and full temporal overlap unlikely.
Health and wellbeing			
Health and wellbeing effects associated with changes to air quality.	Construction (early & peak years) Removal and reinstatement.	None proposed – no significant effects identified.	Negligible adverse (**not significant**).
Health and wellbeing effects associated with changes to noise & vibration.	Construction and operation.	No further practicable and proportionate mitigation available.	Moderate adverse (**significant**) – rail proposals (construction). Moderate beneficial/adverse (**significant**) – two village bypass (construction and operation). Minor adverse (**not significant**) – Yoxford roundabout (construction and operation). Minor adverse (**not significant**) – northern park and ride (construction).

Receptor / topic	Phase	Mitigation	Cumulative Effect
			Minor adverse (**not significant**).
Health and wellbeing effects associated with changes to transport.	Construction and operation.	None proposed – no significant effects identified.	Minor adverse (**not significant**).
Health and wellbeing effects associated with changes to socio-economic factors.	Construction	None required.	Moderate beneficial (**significant**).
Health and wellbeing effects associated with changes to radiological exposure and changes to EMF.	Operation	No further mitigation proposed, as no significant effects identified.	Negligible adverse (**not significant**).
Health and wellbeing effects associated with changes to healthcare capacity.	Construction	No further mitigation proposed, as no significant effects identified.	Minor adverse (**not significant**).
Health and wellbeing effects associated with changes to general stress and anxiety.	Operation	No further mitigation proposed, as no significant effects identified.	Minor adverse (**not significant**).

References

4.1 Suffolk County Council (2018) Suffolk Minerals and Waste Local Plan, Suffolk Waste Study April 2018

4.2 Department of Energy and Climate Change (2011) Overarching National Policy Statement for Energy (EN-1).

4.3 Department of Energy and Climate Change (2011) National Policy Statement for Nuclear Power Generation (EN-6).

4.4 East Anglia ONE North Environmental Statement Volume 1, Chapter 30 (Tourism, Recreation and Socio-economics) (2019)

4.5 East Anglia TWO Environmental Statement Volume 1, Chapter 30 (Tourism, Recreation and Socio-economics) (2019).

4.6 East Anglia THREE Environmental Statement Volume 1, Chapter 28 (Socio-economics, Tourism and Recreation) (2015).

4.7 Infrastructure and Projects Authority, Analysis of the National Infrastructure and Construction Pipeline (2018)

4.8 Guidelines for Landscape and Visual Impact Assessment, Third Edition. Landscape Institute and Institute of Environmental Management and Assessment (2013).

4.9 East Suffolk Council (2019), Suffolk Coastal District Council Local Plan: Final Draft Plan.

4.10 Hoskin R & Liley D. 2018. Habitat Regulations Assessment of the Suffolk Coastal District Local Plan at Final Draft Plan Stage.

4.11 Statutory Instruments 2017 No. 1012. The Conservation of Habitats and Species Regulations 2017

4.12 Her Majesty's Stationary Office (2016), Environmental Permitting Regulations (England and Wales) 2016.

4.13 Her Majesty's Stationary Office (1991), Water Resources Act 1991.

4.14 Suffolk Shoreline Management Plan (2010) Suffolk Coastal District Council

4.15 The Planning Inspectorate (2019), Advice note seventeen: Cumulative effects assessment relevant to nationally significant infrastructure projects.

4.16 Scottish Power Renewables. 2013. Joint Nature Conservation Committee and Natural England Suggested Tiers for Cumulative Impact Assessment. 3 pp

4.17 Scottish Power Renewables. 2019a. East Anglia ONE Offshore Windfarm. Environmental Statement. Volume 1. Chapter 9: Benthic Ecology.

4.18 Scottish Power Renewables. 2019b. East Anglia TWO Offshore Windfarm. Environmental Statement. Volume 1. Chapter 9: Benthic Ecology.